

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Boilers for Water Works.

For a long time the boilers used in connection with the celebrated pumping engine of the Cornish mines held supremacy in the popular estimation as completely as did the engine with which they were associated. They were designed to burn coal very slowly upon a grate of large dimensions, combined with an extraordinary amount of heating surface. They were cylindrical in form, with a large flue running the whole length, one end of which constituted the fire-box. The gaseous products, after leaving the fire, traveled through the remainder of this large flue, or through two smaller flues, which were sometimes substituted, to the rear of the boiler, then back to the front and under one half of the shell, and again to the rear under the other half on its way to the chimney. A very slow rate of combustion was insisted upon, and the greatest care taken to prevent radiation.

given quantity of steam at 100 lbs. per square inch as to make it at 50 lbs.

Moreover, the initial and inevitable losses connected with the use of steam bear a smaller proportion to the high than to the low pressure. A non-condensing engine expends about 15 lbs. per square inch uselessly in overcoming atmospheric pressure against the piston. In such a case, if the working pressure were but 20 lbs. above zero, very little would be left for useful propulsion. But if the working pressure were increased to 100 lbs., the percentage of loss adverted to would be very much reduced. Similar laws apply to all engines, whether condensing or non-condensing, and constitute the most important arguments in favor of high boiler pressures.

But while giving them due consideration, the more important point is the safety and durability of the machinery employed. One of the most distinguished hydraulic engineers of the day says, upon the most careful con-

The fact that the most active part of the fire is expended under the body of the boiler is a good feature of protection in case of accidental deficiency of water, as the upper tubes, which are the first to be bared, are not exposed to direct heat. The cylindrical form is the very best of all forms, and the numerous tubes operate as longitudinal ties between the two flat heads. It is difficult to imagine anything in the way of a boiler more simple, strong or durable. The ends of the tubes are easily accessible, and the ordinary deposit of sediment can be conveniently removed. The setting is double, with exterior expansion walls inclosing an air space. It is a rare thing for these settings to suffer materially from cracking or displacement, while the protection against loss of heat from radiation is almost complete. When combined in pairs or sets for duplicate service, these boilers are furnished with entirely independent steam pipes, water pipes and feeding connections, to allow of the use of

that, on the scale of a thousand horse-power, the interest would amount to more than the saving of fuel." As that was at a time when coal was several dollars per ton higher than it is at present, the showing in favor of such boilers as those we speak of would be much greater.

Since the day of the tests named above, the last-named boiler has held its place in the first rank, when properly proportioned and managed. It is not a good boiler under other circumstances, for it will not bear crowding.

Boilers of this pattern are in very general favor in the Eastern States. They are used both for large and small powers by machine shops and factories. As the cost of coal is a heavy item in the cost of power, only the cheapest and most economical forms of boiler can be used successfully. These boilers work well when of comparatively small size, and we have some modified forms of them which could be set almost like portable boilers. The allowance of heating sur-

public attention, it is well to remember that the best result attainable from the combustion of a pound of pure carbon, in a laboratory experiment, is set down by good authority at 15 pounds, nearly. This does not leave much in the way of improvement upon such boiler practice as we have been considering, after deducting 15 per cent. from the value of the coal for ashes, clinker and waste.

It must also be remembered that the difference between a good and a poor fireman will often amount to from 30 to 40 per cent. in the amount of fuel used; consequently, when parties begin to boast of a very high economy, and promise remarkable savings in fuel, it is safe to remember that the fireman can make greater differences in the working of almost any apparatus than extravagant inventors usually claim.

One of the most difficult of all experiments, and perhaps the most uncertain in its result, under different conditions of man-

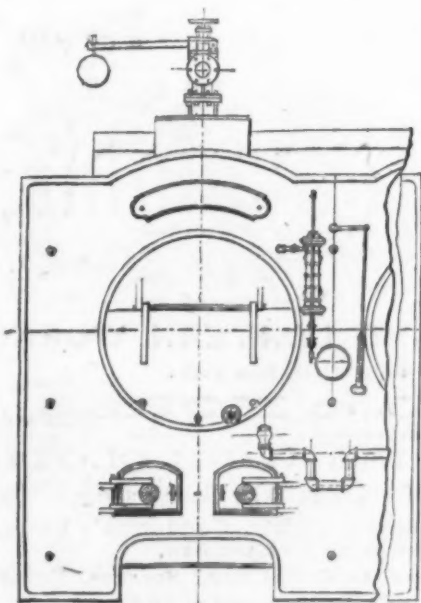


Fig. 1.—Elevation of Front End of Boiler Setting.

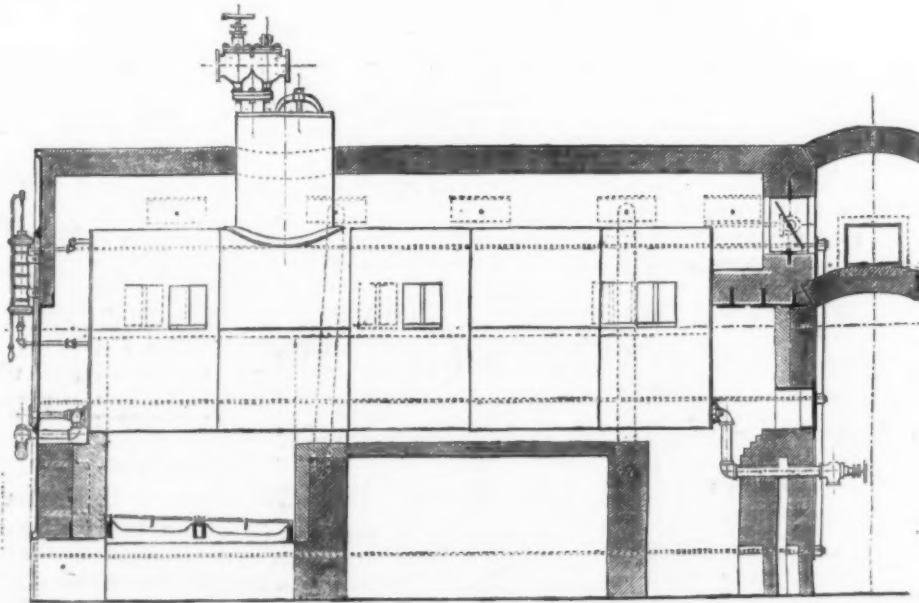


Fig. 2.—Longitudinal Section through Brickwork, showing Arrangement of Flues and Method of Making Connections.

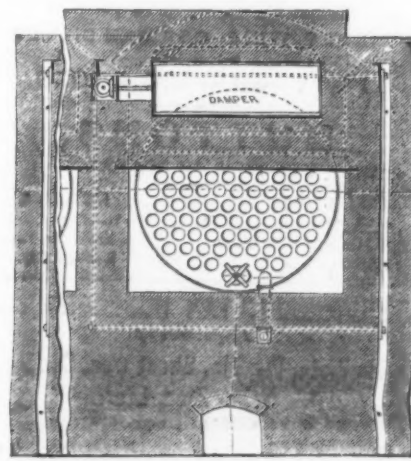


Fig. 3.—Cross Section through the Back Connections, showing Damper, Rear End of Boiler and Air Spaces in the Brickwork.

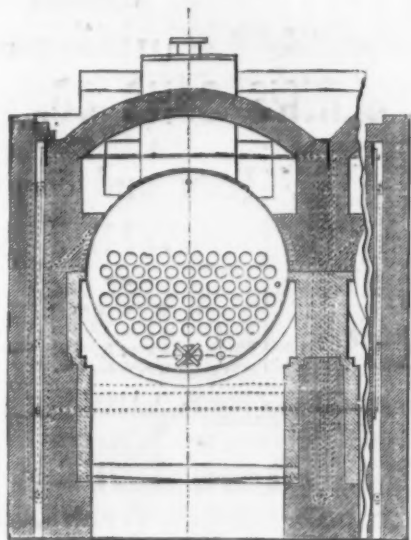


Fig. 4.—Cross Section of Brickwork through Center of Furnace, giving Section of Flues, and showing Front End of Boiler.

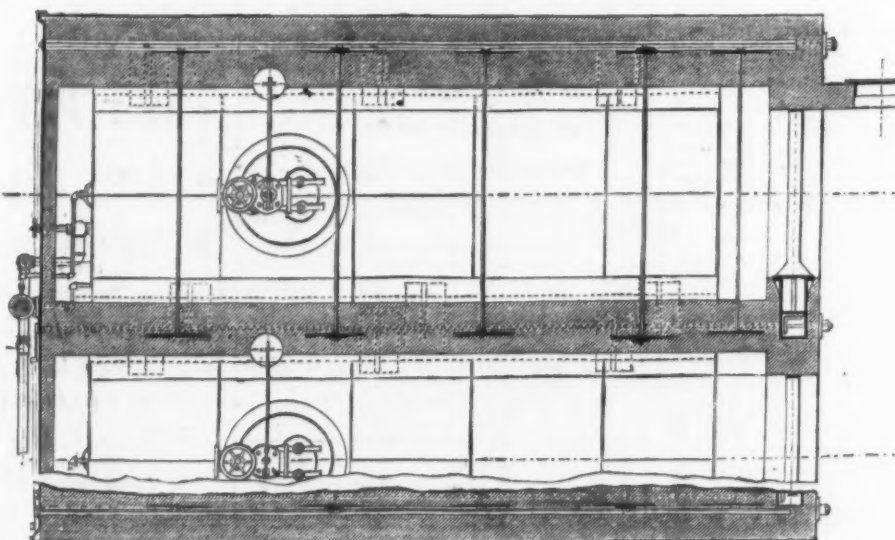


Fig. 5.—Top View of Boiler and Horizontal Section through Brickwork on Line of Ties.

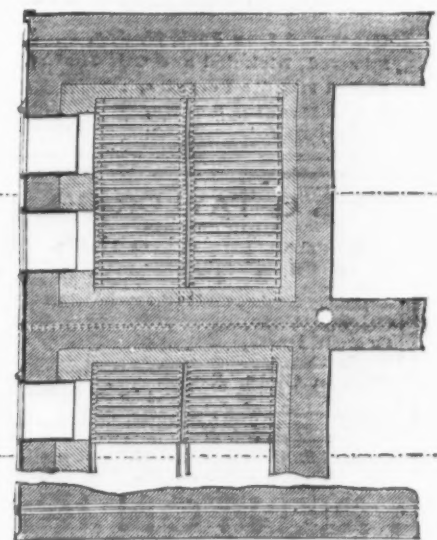


Fig. 6.—Horizontal Section through Brickwork on Line of Grate.

BOILERS FOR WATER WORKS.

But although very efficient and economical in the use of fuel, the boiler was objectionable in its form and expensive in proportion to the fire surface exhibited. For this country a boiler of this kind is out of the question in any but the largest works, and even in them it is not desirable, for subsequent practice has fully demonstrated that its claims to exclusive preference are by no means tenable. Whatever form may be adopted, the considerations of safety, steadiness of action and durability are so controlling as almost to preclude the use of any not conspicuous for these characteristics.

As to the pressure of steam under which it is desirable to work, it is doubtless true that a boiler can be made to withstand 100 lbs. per square inch as well as 40 lbs. But it is also true that the tendency is to take more or less risk and run closer to the margin of safety, rather than to increase weight and cost to the full degree required for increased pressures; and whether from prejudice or ideas deduced from general observation, there is certainly a feeling of increased responsibility in the mind of almost any careful man called upon to manage large boilers working under unusually high pressures. The gain in their results from the fact that twice as much coal is not theoretically required to make a

sideration of the subject, that he has not been able to see anything in the results shown as attainable, to warrant departure from very conservative and moderate standards. Undoubtedly some increment of duty and some reduction in size and cost of engines might be gained by the use of steam at higher pressures, but not enough to justify the practical sacrifices which their realization seems to demand.

In this gentleman's very extensive practice the boiler almost exclusively adopted has been the form known as the return tubular boiler, of which we give several drawings. In his practice the largest diameter he has yet employed is 6½ feet, with 4-inch return tubes, 18 feet long, limited to an extreme working pressure of 60 lbs. per square inch. The fire first passes under the boiler, returning through the tubes, and then over the top of the boiler into the chimney, as shown in the drawing; or else dispenses with the top return, and enters the chimney located at the front of the boiler. As the heat is effectually withdrawn by the passage of the gases through the flues, the top return has no appreciable effect in surcharging the steam. It is frequently inconvenient to locate the chimney at the front end of the boiler, and this compels the top return arrangement in many cases.

either one during the repairs of the other or others.

The evaporative results obtained by these boilers, as compared with those from some of the well known and standard forms of boilers, are worth attention.

The report of experts to the Brooklyn water works in 1857 and 1859 dealt carefully with this subject, and gave the following results, which have always been considered good standards for comparison:

Hartford Water Works.—Drop-flue boilers, 10.43 lbs. of water evaporated per lb. of coal from temperature of 60 degrees.

Jersey City Water Works.—Cornish boilers, 10.02 lbs.

Cambridge Water Works.—Return tubular boilers. Not exactly stated, but about 10 lbs.

Better results than these are possible, it is true, but they would probably cost more than they would be worth. This was well illustrated by a reply made by Mr. Root, the well known boiler maker, some years ago. In answer to the question whether he could build a boiler which should greatly exceed a certain given duty, he said it could be done, and after a few minutes figuring upon paper, added, "The apparatus for evaporating another pound or pound and a half of water for each pound of coal would cost so much

face in the Cornish practice was oftentimes as high as 50 square feet per actual horse-power of 33,000 lbs., and it was very commonly 30 or 40. But 22 square feet, not counting the top return surface, is ample allowance per horse-power in the return tubular boiler, the average activity of the fire surface being considerably greater than in the Cornish boiler. Neither is it necessary to confine the combustion to the slow rate of 4 lbs. per square foot of grate per hour, as was the general Cornish practice. Very good results, and perhaps as good as any attainable in ordinary practice, where thin and light fires are apt to suffer from neglect, can be got from a combustion of about 8 lbs. per hour.

It will be understood that the views above advanced do not apply to the peculiar forms of boilers made necessary by the impurity of the water used for supplying them. Where deposits of scale or sedimentary matter in considerable quantity exist, it might be unprofitable to use any but the most elementary form, with a view to facility for cleansing, at some sacrifice of economy in evaporation. In by far the greater number of places where water works are to be erected, comparatively good water for boilers may be obtained if reasonable care is taken.

In judging of the claims of the new boilers that are constantly presented to the

agement and pressure, is the one of ascertaining the evaporative power of a boiler. The rate at which coal is burned largely qualifies the result, and the rapidity of the evaporation affects the amount of "priming" or water held mechanically in the steam, or "entrained," as it is called. Anhydrous steam, by which is meant steam with only its theoretical proportion of water, is rarely, if ever, produced. A percentage of water in excess of this quantity is probably always present. How much or how little this may be depends upon the proportion of the boiler to its work, the area of its steam delivering spaces, the amount of steam room and good or bad form generally. Intermediate between the condition of foaming, which will empty a boiler of all its water with dangerous rapidity, and that of wet steam, so called, almost every concentrated and active boiler will be found, and on such it is very difficult to make a correct trial of evaporation. Causes like these probably account for the extraordinary claims daily made of evaporative results as high as 12 and even 14 lbs. It may be noticed as a suspicious circumstance in almost all such cases, that the rate increases with the activity and irregularity of the water circulation within the boiler.

It may, therefore, be said that practice

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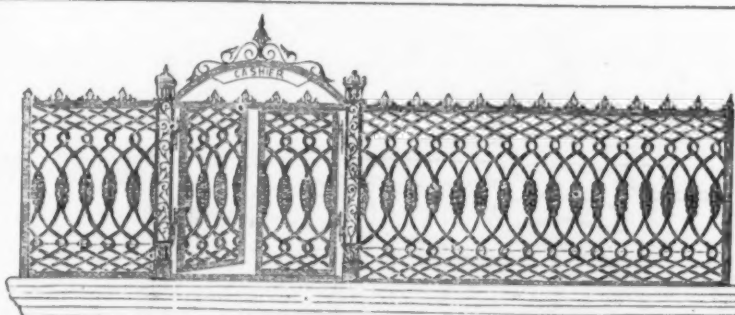
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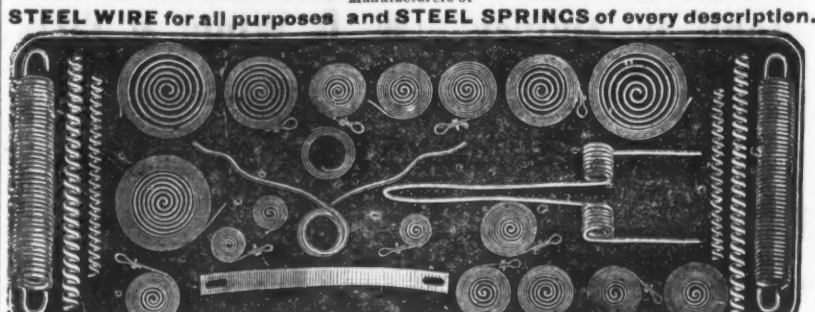
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corroborates the declaration that if due regard be paid to the apportionment of fire and grate surface, and to the setting and management of boilers, the difference in results between the several approved forms in use will not be very great in this special department, where considerations of weight and room are neither controlling nor specially important, and that no good can result from the employment of more active and concentrated forms, which are liable to rapid alterations in pressure, require greater care in management and are more subject to derangement.

The accompanying engravings, drawn to a scale of one-fourth of an inch to the foot, show in a very complete manner the details of a return tubular boiler of the pattern which we have mentioned. The boiler is, in this case, one of a set, but all the fittings and connections are so made as to enable each boiler to be used independently; hence the only difference in the setting necessary for a single boiler would be to build the furnace and outside walls alike on both sides.

Fig. 1 shows a front elevation of the boiler, with all the usual appliances. Two doors open into the furnace, each about 18 inches wide by 12 inches high. Fig. 2 is a longitudinal section through the brickwork, showing the general arrangement of the setting. At the front end there are no features particularly noticeable beyond the connections, which are very carefully designed. Instead of a combustion chamber back of the bridge wall, an apron is carried along to the back connection in such a way as to form a thin flue, less than 6 inches deep, from the furnace back to within 18 inches of the back end of the boiler, a distance of 8 feet. The furnace is 4 feet long. The boiler is 54 inches in diameter by 14 feet long and has 65 3-inch tubes. Through these tubes the gases from the back connection are returned to the front of the boiler. By this arrangement it will be seen that it is intended to obtain very perfect combustion in the furnace. This is comparatively easy, as the amount of coal burned per square foot of grate surface per hour is quite low. From the front end the gases return over the top of the boiler, which is covered by an arch. This top flue, shown in section in Fig. 4, is about 15 inches deep. A damper at the back end of the top flue controls the draft. This damper is worked by a handle seen hanging at the right of Fig. 1. Bevel wheels, shown in Fig. 3, carry the motion of the long shaft to the rod on which the damper is hung. This arrangement is also shown in the plan, Fig. 5. Both side and back walls of the setting are built with spaces in them. A cross section just in front of the steam dome is shown in Fig. 4. The arrangement of tubes is such as to leave a considerable body of water near or on the bottom plates of the boiler. The lugs by which the boiler is held are not arranged opposite each other (see Fig. 5), but are staggered. The rods, also shown in the same figure, hold the top of the walls together and take the thrust of the arch over the top flue. The furnace, of which a plan is given in Fig. 4, presents no features which need especial remark. The width might, at first sight, seem excessive but for the fact of the double fire doors.

The Melbourne Exhibition.

In Melbourne, one of the largest cities of Australia and capital of Victoria, which may be regarded in many respects as the principal colony of the country, an international exhibition is to be held next October. All the great nations have decided that their manufactures and produce should be well represented thereat, and have already secured ample room for their exhibition. The United States government has, through its agent, Mr. Thomas B. Pickering, applied for 30,000 square feet of space for the accommodation of American manufacturers. This space will in all probability be granted, but should any unforeseen difficulties arise the State Department will be requisitioned to erect an annex, as it has done before in many instances, so that ample room will be secured for the most advantageous exhibition of American specialties and produce. Leading men in different departments of manufacture have so eagerly taken up the idea that 17,500 square feet have been already secured, and by every mail letters are received by Mr. Pickering either requesting information or applying for space. Shipping houses, both in New York and Boston, have offered reduced rates for the freight of goods destined for show, some of them even soliciting the transportation of freight at somewhat less than half their usual rates. The exhibition will continue open from October 1, 1880, to March 31, 1881. All exhibits of whatever description will be admitted free of duty, and a special inducement is offered to the owners of works of art by a regulation prohibiting the copying, photographing or reproduction in any way of any article without the special permission of the exhibitor. Machinery is protected in a similar way, and inventors of new articles need be under no apprehensions, as protection is amply provided by the patent laws of the colony. Arrangements have been made to provide steam power so that all machinery may be seen at work. This steam power will be supplied gratuitously to all persons making application for it. England has, as might be expected, made arrangements for a very large space. America and Germany follow next on the list. Then come France, Austria and Italy.

A large number of American business men have formed an opinion that the Australian colonies are so clannish and attached to the mother country, that nothing will be purchased unless of British manufacture. This is very erroneous. At the Paris Exhibition, in 1878, the Australian farmer was well represented, and a large number of machines used in agriculture, and especially those with labor-saving appliances, found a ready sale. In fact, in Australia there is a splendid field for American speculation, and it is a matter of surprise to many merchants that measures have not been taken to develop trade with that country. It may be interesting to give a few statistics which indicate the vast and growing importance of the trade of Australia. By the latest available returns it is shown that, in the year 1876 the commerce of Australia

amounted to a total of \$462,950,000. In Victoria the imports amounted to \$78,520,000, and the exports, \$70,070,000. In the same year Australia took British manufactures and products to the value of \$92,072,500, the United States during the same year having sent only \$7,000,000 worth. It may be mentioned that the New Zealand railways, which are under colonial government control, have all their furnishing of the latest American invention, and 300-horse-power boilers and engines have recently been exported there from this city. When the above statistics are considered, it will be seen that Australia is a most desirable market, and there is no reason why the manufacturers and producers of the United States should not avail themselves of this opportunity to extend their trade there. In Australia there is always a demand for woodworking machinery, especially for the use of carpenters and builders, for stone-cutting and dressing machines, agricultural implements, appliances for sheep-shearing, every description of machinery used in the dressing of wool and the manufacture of woolen goods—which is a staple trade in Australia—all kinds of mining machinery, railway appliances, including steel rails and rolling stock, iron bridges, &c.; general and special tools and machines adapted for the construction and repair of machinery; complete systems of narrow-gauge railway; permanent and portable forges; plain, strong and economical steam engines, portable and stationary, with boilers, manufactured with a view to easy transportation; machinery for the production of tin and sheet-metal goods by the stamping or "drawing" process, American specialties in household hardware, silver-plated ware, saws and edge-tools.

Although the above list by no means includes one-third of the articles exhibited, it may suffice to give a general idea of the requirements of the Australian colonies, and may serve as a guide to intending shippers of goods for exhibition. In machinery Great Britain will undoubtedly be America's greatest rival, in hardware Germany will be the chief competitor, while France threatens to run America closely with a splendid show of silver and silver-plated ware, but, judging from the easy victory achieved by Tiffany at the Paris Exhibition, America will, in all probability, have a good chance of winning the prize.

American exhibitors should mark the trade price of the articles exhibited, in order to facilitate the judgment of the jury, as well as for the information of visitors and intending purchasers. Considerable complaints have arisen on this subject at all the great shows of recent years, and it was insisted upon by the jury at the Paris Exhibition that all exhibits should have their prices marked on them in legible figures. The Sydney Exhibition, which has not been anything like a signal success, was held too soon after the Paris one, but this cannot apply to that of Melbourne, as the principal exhibits from Sydney will be transferred to the former city, in addition to those now preparing for it. Applications for space will be received by Mr. Pickering until the 10th of March, and goods may be shipped, if by sailing vessels from New York or Boston, as late as May; but if shipped by way of San Francisco, may leave that port as late as the 7th of July. Mr. T. R. Pickering, who has been connected with exhibitions for many years, and whose name is known in connection with those held at Paris in 1867, at Vienna in 1873, at Philadelphia in 1876 and at Paris in 1878, says that the Melbourne Exhibition will be a grand success, and strongly urges American merchants and manufacturers to send fair samples of their ordinary production, and he predicts a rapid development of American trade in the Australian colonies.

British Colliery Explosions.

So many tons of coal so many lives. Roughly speaking, for every hundred thousand tons of coal raised in Great Britain one human life is paid. From 1861 to 1875, inclusive, 15,995 lives were lost in raising 1,608,576,193 tons of coal, or about 1000 lives a year. In 1864 the life tax was \$57, or one to 110,000 tons; in 1866—the year when on two successive days in December, in the Oaks and Talk-o'-th'-Hill collieries, 425 men were killed—it was 1484, or one to 68,000 tons. In 1877 the loss was 1208; in 1878 it rose to 1413, the highest in 30 years save the memorable year already mentioned. Since the inspection of mines was undertaken by the government the ratio of deaths to persons employed has been steadily decreasing. In 1851 one man of every 219 was killed; in 1876 one of 551. Exceptionally bad as 1878 was, the ratio was one to 336. The Continental rate of loss is higher; in Prussia in 1873 one of every 355 persons employed was killed, as against one of 479 in England; in 1877 the figures were 377 to 409. The English statistics for 22 years were as follows:

1857-60	10,018 lives lost of 2,460,322 tons
1861-70	12,626 lives lost of 3,424,425 tons
1871-78	9,058 lives lost of 3,800,000 tons

The showing is satisfactory enough, though the millennial period anticipated by Robert Stephenson has not yet been reached. There was hardly a colliery in England, he said, that might not be worked with perfect safety from explosions, the great means for insuring safety being to quadruple the shaft area. The most fertile sources of calamity are explosions of fire-damp and gassing way of roofs. Of 1413 men killed in 1878 there were 286 burned or suffocated and 351 crushed, shaft, surface and miscellaneous underground accidents accounting for the remaining victims. If the inspectors and proprietors were only loyally supported by the men the loss of life from explosions would be nil; but though the man who takes matches into the pit, or uncovers his lamp to light his pipe, plays the stake of his own life as well as the lives of the mates to rescue whom from peril he will at all times venture heroically, there is apparently no possible way of stamping out this carelessness, though both inspectors and magistrates do their duty energetically, as readers of English papers can testify.

The list of notable colliery explosions in Britain since the accession of Queen Victoria is a most formidable one, as any person will

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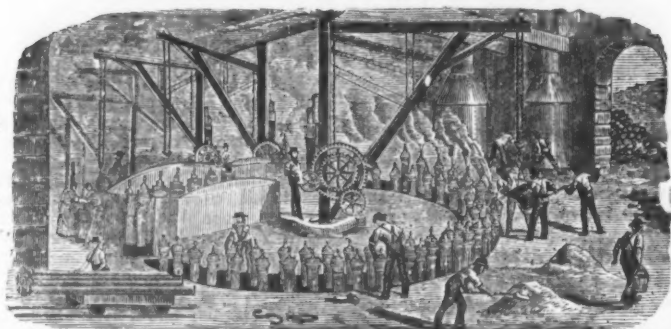
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capable of resisting the attacks of foreign
ironclads in case of war with European
powers.

be prepared from the statistics given above
to hear. October 24, 1835, 35 men were
killed in John Pit, near Whitehaven, two be-
ing blown to pieces while descending into the
shaft—a third, more fortunate, was hurled up
into the air and fell on a bank unharmed.
June 28, 1830, at St. Hilda, near South
Shields, a miner carried a lighted candle into
a foul "board" two miles from the shaft,
killing himself and 59 others. September 23,
1844, of 100 men employed at Haswell,
near Durham, only five, who were shel-
tered behind a train of wagons, escaped alive.
August 21, 1845, occurred the sixth
explosion known at Jarrow, near South
Shields, since 1817: 38 men were killed, be-
sides one rescuer, Defty, who had pressed
onward into the fatal damp too gallantly.
There followed the explosion of the Oaks
Colliery, near Barnsley, March 5, 1847—70
lives: Darnley Main, near the same place,
January 4, 1849—75 lives; Lletty Shenkin,
Aberdare, June 11, 1849—52 lives; Nitshill,
near Paisley, March 15, 1851—62 lives. At
this explosion only two men escaped with
their lives. At Rawmarsh, near Rother-
ham, December 20, 1851, of 52 men 50 were
blown to pieces, and the other two barely
lived to be rescued. At the Duffryn Pit,
Aberdare, May 10, 1852, 64 men were killed,
tumbling over each other in heaps in their
panic-stricken attempts to escape, and block-
ing the shafts as they died of suffocation.
February 18, 1854, at Arley, near Wigan, 89
lives were lost, a few men only being saved
by desperate exertions. July 15, 1856, the
Cymmer Colliery, near Pontypriid, ex-
ploded, 114 lives paying the penalty of a
system of management under which the
ordinary method of testing a "heading"
supposed to be dangerous was to hold a
lighted candle to it. A practical test this,
akin to that for determining whether a spec-
imen of fungus is edible or poisonous—eating
it. February 19, 1857, there was an even
greater loss of life at Lundhill, near Barns-
ley. Of 200 men only 11 escaped; the bodies
of the other 189, when—after a brook had
been turned into the pit and allowed to run
for three weeks—they were recovered, be-
ing boiled and burned beyond recognition.
February 1, 1858, 52 lives were lost by an
explosion at Bardsley, near Ashton-under-
Lyne. March 2, 1860, at Burradon, near
Newcastle, 76 men were destroyed through
using lighted candles; December 1, at
Risca Colliery, near Newport, a miner un-
covered his lamp to light his pipe, and blew
himself and 141 others into eternity. De-
cember 8, 1862, at Edmund's Main, Barns-
ley, 60 men and five rescuers were destroyed,
the fire being only quenched by turning a
stream of water into the pit. June 14, 1866,
at Dukinfield, near Ashley, 37 men were
killed, making 366 lives lost in the fatal
place since the pit was first sunk five years
before. December, 1866, will long be a
memorable month in the annals of colliery
accidents. On the 12th the Oaks, near
Barnsley—where, in 1847, 70 men were
killed—exploded, killing 312 men; a second
explosion followed as the searchers pressed
into the pit, and 28 of them perished. Ex-
plosion after explosion succeeded, making it
impossible to enter the pit; but at 5 a. m.
on the 14th, the signal bell at the top of the
shaft was rung, and two men, Mammott
and Embleton, going down, brought up
Samuel Brown, one of the searchers, who
had been wandering in the inclines for 24
hours, falling over the bodies of the slain at
every turn, till at last he groped his way to
the shaft. The fire raged so furiously that
it was necessary to fill up the shaft. Yet so
little effect has a calamity of this kind that,
on the next day, at Talk-o'-th'-Hill, North
Stafford, a man went to his work with an
exposed light, and 85 lives went out in a
blast of flame and poison. November 8,
1867, an explosion took place at Ferndale,
South Wales, when 167 of 170 men and boys
perished. June 10, 1869, the same pit blew
up, killing 60 of 120 workers. In 1868,
on the 26th of November, at Hindley
Green Pit, at Wigan, an explosion had
killed 61 of 70 men. June 21, 1860,
Queen's Pit, at the same place, blew up with
a loss of 58 lives. September 6, 1871, at
Moss Colliery, at the same place, 60 men
and boys were killed. The explorers brought
up some workers after the first shock, but a
second explosion followed, and the sides of
the pit were set on fire, and there was
nothing for it but to fill up the shaft, and if
there were any still alive underground, leave
them to their fate. April 14, 1874, in the
Astley Deep Colliery, at Dukinfield, an ex-
plosion took place which imprisoned behind
the fallen roof 60 men, of whom 50 died ere
the rescuers could reach them, one of the
ten survivors dying shortly after he was
taken out. On the 30th of April, 1875, an
explosion at Bunker's Hill, North Stafford,
destroyed every soul that was in the work-
ings—42 men in all. On the 6th of Decem-
ber, in the Swaithe Colliery, at Barnsley,
140 men were killed in an explosion, several
minor accidents happening about the same
time. On the 22d October, 1877, Dixon's Col-
liery at High Blantyre, near Glasgow, blew
up; only 20 of the 213 men in it were res-
cued and several of these died. One hun-
dred widows and nearly 300 young children
were left destitute by this catastrophe. On
the 7th of June, 1878, in the Wood Pit, at
Haydock, near Wigan, there were 200 men
at work when an explosion took place; only
18 were got out, and one of them died on his
way home. A still more frightful explosion
occurred at the Abercane Colliery, near
Newport, September 11, 1878, in which 260
men and boys perished. During the year
that has just closed the most serious ex-
plosions were at the Dinas Colliery, January
15, in which 58 lives were lost, and at the
High Blantyre Pit, near Glasgow, July 31,
in which 27 miners perished.
Such is the dreadful record of the last 40
years, to which the one just entered upon
has already commenced to contribute its
share, by an explosion which took place on
the 21st inst., in the Lyett Colliery, at
Newcastle-under-Lyne, in which the lives
of 76 men were lost.

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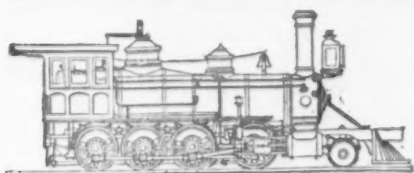
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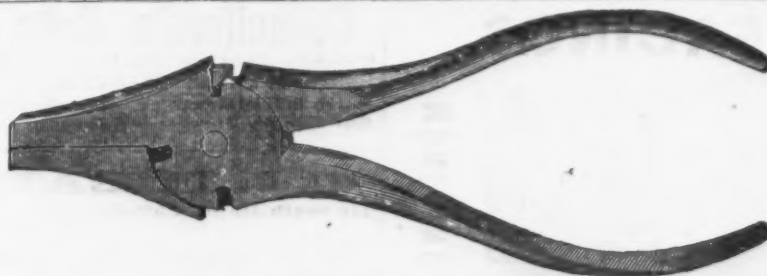
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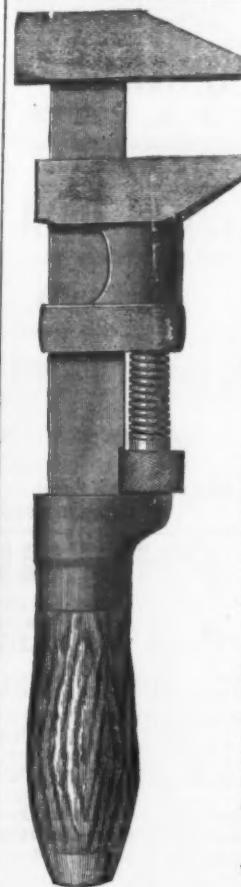
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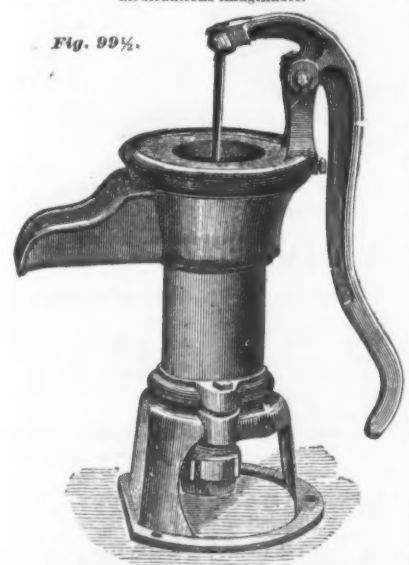
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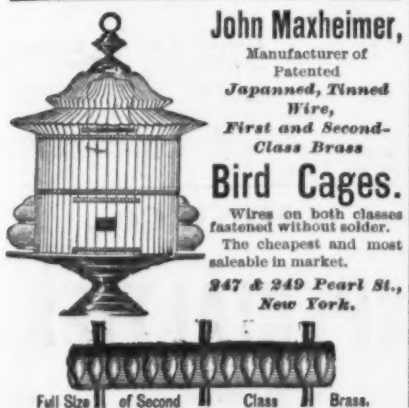
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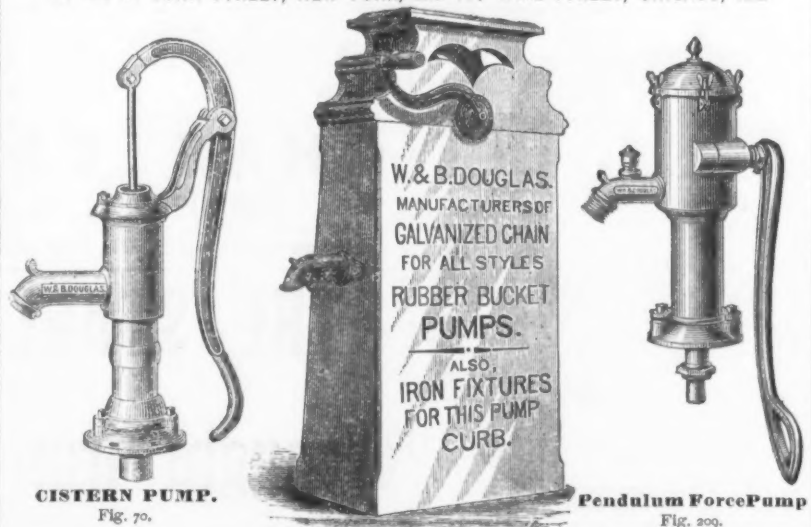


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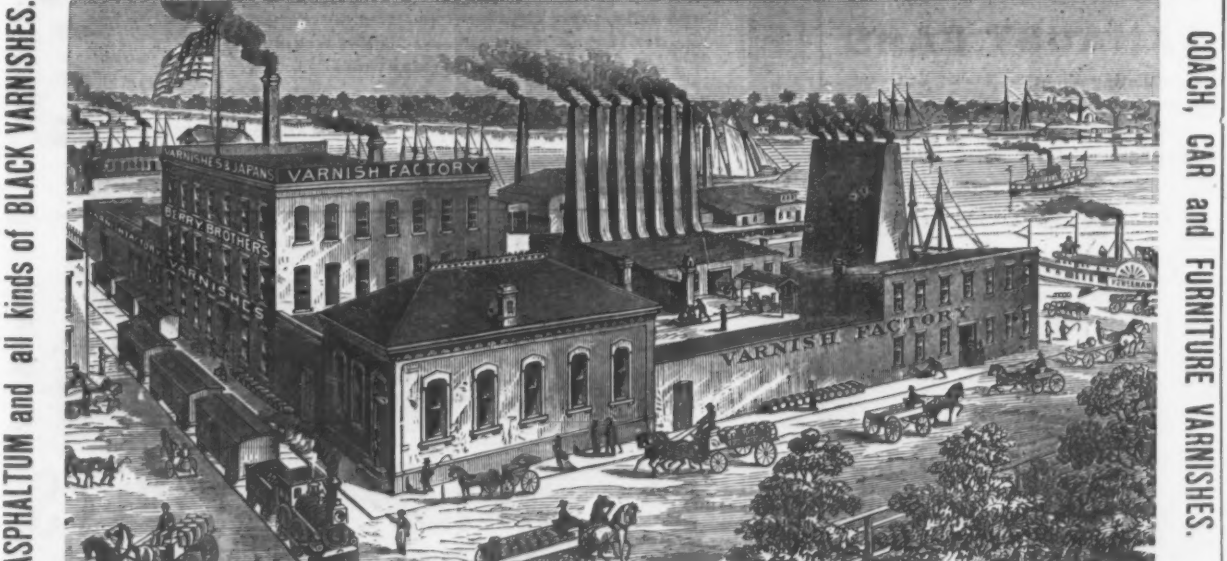
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**The Chemical Composition of Pig Iron
as Affecting Its Value for Foundry
Purposes.**

So numerous are the circumstances which
affect the value of pig iron for foundry pur-
poses, that it would seem almost a hopeless
task to endeavor to draw inferences from its
chemical composition upon its properties.
One grade of pig rarely combines all the ele-
ments which will insure the production of
castings fit in every respect for the purpose
desired, and it is generally necessary to re-
sort to mixtures of various classes, so
chosen that the defects of one counter-
balance and correct those of the other, while
at the same time the practical founder is
limited in his choice by the prices and the
variety of the material which his local mar-
ket offers to him. The question how to pro-
duce, at the lowest price, the best castings
with the metal within easy reach is, there-
fore, a delicate one; and it is by no means
astonishing that founders, relying upon
their experience alone, have strong prefer-
ences for certain grades of metal, and are
willing to obtain mixtures in which they
have confidence, even at a sacrifice, because
they are frequently ignorant of the reason
of the superiority of their pet brands. They
are frequently excessively conservative, and
find it difficult to adapt themselves to altered
circumstances. While in the end actual
tests alone can serve to decide upon the
merits of an unknown brand, there can be
no doubt that a knowledge of the chemical
composition of the pig may serve as a guide
in more rapidly and cheaply arriving at a
final conclusion. In order to correctly ap-
preciate the effect of certain chemical im-
purities or constituents, it is necessary to
possess at least a general idea of their effect.
The result, of course, can only be an ap-
proximation, because no exact formula can
be devised, the presence of one substance in
the pig either intensifying or counterbal-
ancing the effect of others. As the precise
effect of even a single impurity, if alone,
cannot be numerically expressed, it is ob-
viously impossible to predict closely what
will be the result of one of the innumerable
combinations between four or five chemical
impurities. Yet, as we have already stated,
every chemical constituent of the pig has a
well-defined effect upon all or a few of the
properties desirable in the finished product.
A work recently published by Prof. Lede-
bur, of Freiberg, Germany, admirably sum-
marizes the main points in question, and
from it we take the following data:

Pig iron always contains carbon, the low-
est amount being 2.3 per cent., and if it has
little manganese, not over one-half of one
per cent., the amount rarely exceeds 4 per
cent., while 5 per cent. may be considered a
maximum for pig iron low in manganese.
The capacity of pig for absorbing carbon in-
creases with the percentage of manganese,
and, therefore, 5 per cent. is common when
there is 15 to 20 per cent. of manganese,
while with ferromanganese, an alloy running
as high as 85 per cent. of manganese, it rises
to 6.5 or even 7 per cent. of carbon. It is an
important fact that as the carbon increases
the point of fusion of the iron goes lower.
Liquid cast iron has all the carbon in solu-
tion, but when the metal chills, a portion of
it is separated as graphitic carbon, which
causes the fracture of the metal to look gray,
and is the characteristic constituent of gray
pig. The size and the amount of graphitic
carbon in cast iron depends primarily upon
the rate of cooling of the metal, the maxi-
mum being reached when it is done very
slowly. This gives the founder an op-
portunity to control the quantity of graphitic
carbon in the castings, and the fact men-
tioned above explains why the graphite is
greater in those portions of castings which
are large and cool slowly than other thinner
parts which chill rapidly. It is not neces-
sary, however, to remelt cast iron and allow
it to chill under conditions different from
those under which they first cooled in order
to change the amount of graphitic carbon.
Continued heating at a bright-red tempera-
ture, and gradual cooling by packing in some
poor conductor of heat, will suffice to turn
castings which have become white by too
rapid chilling, into gray cast iron. This tem-
pering process, which has nothing in com-
mon with the process of making malleable
iron, is resorted to occasionally in works
which are forced to use metal tending to pro-
duce white castings. The effect of the pres-
ence of graphitic carbon is to loosen the grain
of the iron, and reduce its density and
tenacity on the one hand, while on the other
it renders the work of cutting the metal
with turning and shaping tools much easier,
and at the same time reduces its brittleness.
This constitutes its main advantage
over white pig, and while graphitic carbon is
characteristic of gray pig, combined carbon,
the second form, preponderates in white pig,
although it should be noted that it is always
present also in gray pig. The tenacity and
elasticity of iron seems to increase to a cer-
tain limit in direct proportion to the com-
bined carbon it contains, but beyond that
limit the tenacity and, notably, the elasticity
decline very rapidly. The determination
of the exact point when the maximum of
both desirable qualities is reached is an un-
certain matter, because a decrease of the
combined carbon entails an increase of the
graphite, which, as we have already stated,
injuriously affects the tenacity.

The presence of manganese affects both
the hardness and the fusibility of pig iron,
both being increased as the amount grows.
Manganese has a greater affinity for the
metalloids than iron, and it is for that reason
that manganiferous pig is capable of ab-
sorbing a greater amount of carbon. Closely
related to this peculiarity is the fact that it
has a tendency to retain carbon in a com-
bined soluble state, so that the presence of
manganese obstructs the separation of
graphitic carbon and thus tends to prevent
the formation of gray pig iron. While
thus manganese is objectionable in some
respects, it is valuable in others. It has
a great affinity also for sulphur and phos-
phorus, and if the pig be left quietly in a
liquid state, its compounds or alloys with
these bodies rise to the surface of the
metal, purifying it to a certain extent. It
is very effective also in preventing oxidation
of the iron, a circumstance which is some-

times taken advantage of in remelting pig.
Pig iron almost always contains silicon,
the amount varying generally between 0.1
and 4 per cent., but exceptionally rising to
10 per cent. It has the effect of inter-
fering with the capacity of the pig iron to ab-
sorb carbon, but is absolutely essential for
the production of gray pig. Iron free from
silicon remains white even if it is slowly
cooled, and gray pig may be converted into
white metal by withdrawing from it its
silicon. As we have already noted, man-
ganese has a certain effect, and, therefore,
pig may remain white, even if it contained a
sufficient amount of silicon to cause a strong
separation of graphite, if its action be
counterbalanced by the presence of man-
ganese. Again, pig holding several per
cent. of manganese may turn out gray if a
sufficient amount of silicon is present simul-
taneously. Only 0.4 per cent. of silicon, or
even less if phosphorus and sulphur are
absent, will make pig iron gray, provided
the amount of manganese it contains is low.
Those brands are generally highest as regards
the amount of graphite found, which con-
tain 2 to 3 per cent. of silicon and about 4
per cent. of total carbon. As soon as the
percentage of manganese goes beyond one
per cent., the total carbon, it is true, will
increase; but, on the other hand, much
more silicon will be necessary in order to
induce a separation of graphitic carbon.
This relation of manganese and silicon to
carbon explains why melted white pig will
change to gray if it be given an opportunity
to absorb silicon, or to lose more manganese
than is necessary to counteract the silicon
present. Silicon affects the physical prop-
erties of pig in a manner quite similar to
carbon, although the action is much weaker,
so that one part of carbon may be consid-
ered equivalent to about two to five parts of
silicon. It should be noted, however, that
the presence of graphitic carbon caused
by the silicon may modify or even counter-
balance its effect. This explains why silice-
ous gray pig is not so hard as, and much
more easily worked than, it would be if the
silicon were not present, and that, for the
same reason, it is less brittle than white pig
free from silicon. At the temperature of
melting iron, silicon possesses a strong af-
finity for oxygen, so that the greater por-
tion may be removed by an oxidizing action,
and the pig be thus converted into white
metal. Under certain circumstances, not-
ably by the presence of manganese and ma-
terials rich in silicon, additional amounts of
silicon may be introduced into the iron.

Phosphorus is a frequent impurity in pig
iron, the amount varying from a trace to as
much as 3 per cent. Its effect is to sensibly
reduce the hardness, and notably to affect
the elasticity and toughness of the castings.
Phosphoric pig is not capable of resisting
shocks or concussions without breaking, and
this disadvantageous effect is increased as
the amount of combined carbon grows. For
most purposes a percentage lower than 0.5
per cent. is not likely to make castings liable
to sudden fracture, but it is more plainly
noticeable at 1 per cent., and becomes dan-
gerous at 1.5 per cent. The brittleness of
phosphoric castings is affected by the
amount of combined carbon, and as the lat-
ter increases as the percentage of silicon de-
creases, an average amount of the latter will
act favorably upon the use of such metal for
castings. Pig holding more than 1.5 per
cent. of phosphorus should under no cir-
cumstances be used, unless it is mixed with bet-
ter grades. The fluidity of molten pig is
greater when phosphorus is present, and
such metal sharply fills the molds and chills
with a smooth surface, and it is for this
reason that a moderate percentage, not over
1 per cent., is considered quite acceptable.
It must be kept lower, either when it is de-
sired to produce castings which are expected
to be able to resist shock well, or when the
articles produced are thin. In the latter
case rapid cooling increases the percentage
of combined carbon, which, as we have
noted, exaggerates the action of phosphorus.
It is, therefore, extremely erroneous to be-
lieve, as many text books teach, that phos-
phoric pig is the best material for art cast-
ings. Phosphorus impairs the formation of
graphitic carbon, and therefore acts in this
respect like manganese, although not in so
pronounced a manner. If two brands of pig
possess the same percentage of carbon, then
the one being highest in phosphorus must
also contain the greater amount of silicon, if
the castings produced from both are to be
equal as regards the amount of graphitic
carbon.

The quantity of sulphur carried into pig
iron during the process of smelting ores in the
blast furnace, naturally depends primarily
upon the amount which the ores themselves
contain, but it is greatly influenced, also, by
the nature of the blast furnace cinder, the
amount being greater if the cinder is high in
silica. The presence of sulphur has the
effect of impairing the tendency of the
carbon to separate in the graphitic form,
and of decreasing the dissolving capacity of
the iron. As regards the latter its action is
opposed to that of manganese, while con-
cerning the former it would counterbalance
the desirable effect of any silicon present. It
is much stronger in this respect, pig contain-
ing 1 per cent. of phosphorus remaining
white even if considerable quantities of
silicon are in the metal. A small per-
centage of sulphur is advantageous rather
than otherwise, as regards the strength and
elasticity of the castings, provided the in-
crease in the amount of combined carbon
caused by its presence does not impair this
result. It is for this reason that for cast-
ings which are to be made very strong, pig
is used with much success that runs as high
as 0.1 per cent. But, as a rule, sulphur is
not desirable beyond 0.06 per cent., because
in even as small a quantity as 0.1 per cent.
it is injurious in other respects. It is a serious
inconvenience which sulphur produces, that
the pig will remain thick even at high tem-
peratures, and that it does not well fill the
molds.

Such is the effect of the various chemical
impurities upon the quality of pig iron for
castings. It will be noted how largely
various bodies differ, and how the simul-
taneous presence of one or more in ap-
preciable quantities is apt to counterbalance
the good effect or correct the defects occasioned
by others. We may state, in conclusion, that
arsenic, if present in quantities of about

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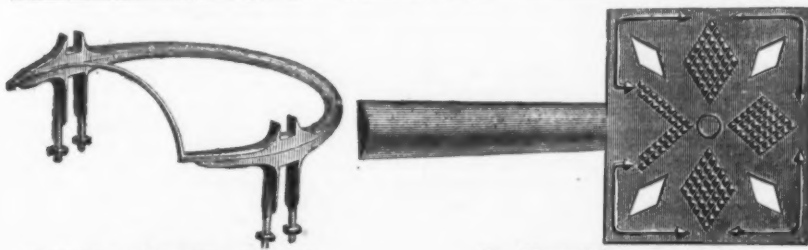
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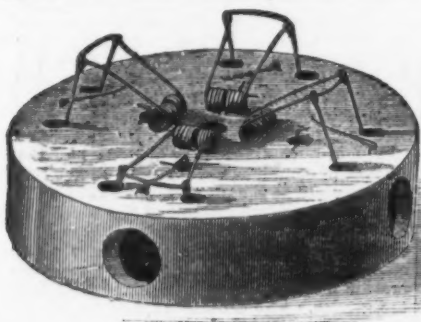
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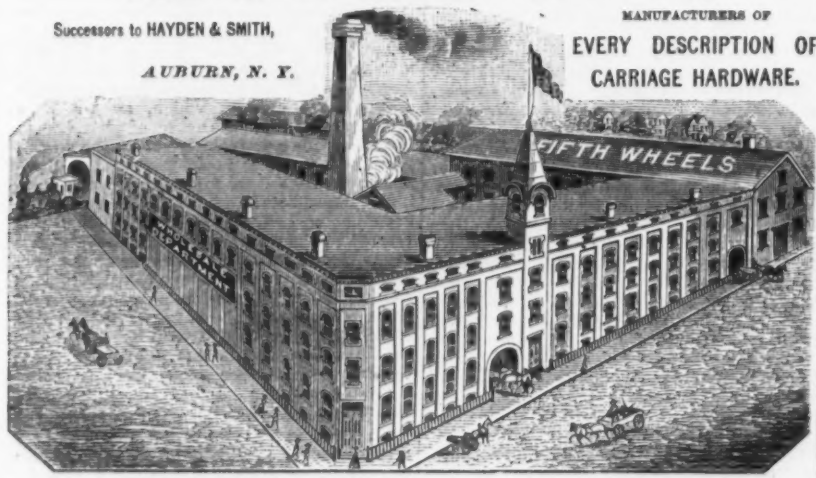
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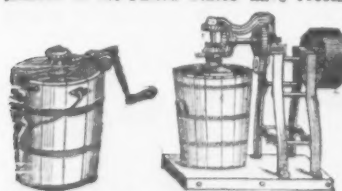


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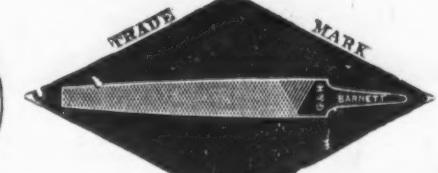
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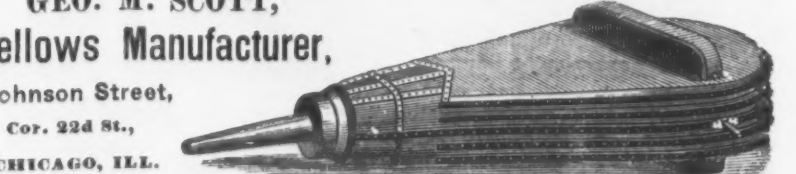
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The West and its Prospects.

A newspaper correspondent has interviewed Mr. Robert P. Porter, the eminent statistician, and reports his views as follows:

"We are so soon to have a new census," he replied, "that one needs to be modest in his statements. The facts which I have collected give a sort of comparative view of the growth of the three sections of the country, and bear especially on the economic changes that have taken place in the past decade in the East, West and South. In 1860 the population of the nine Eastern States (including New York and Pennsylvania) was 10,594,300; the nine Western States (excluding Ohio), 6,752,368; and the thirteen Southern States, 10,259,016. By a careful estimate I find that at the close of 1879 the population of the Eastern States had reached 14,303,000; that of the Southern States, 14,295,000, and that of the Western States, 14,655,000. Thus, while the population of the South probably increased 4,025,984, and that of the Eastern States 3,808,706, the nine Western States have in nineteen years gained 7,902,632, an increase nearly equal to the aggregate increase of the Eastern and Southern States in the same period."

"To what do you attribute this unequal increase?"

"To a law of nature which mathematicians call 'the law of least effort.' Man follows this law in the satisfaction of his wants, and, when his movements are free, as in the United States, the conformity of his action to this principle may be closely traced. Not only has the farmer drifted West, but our manufactures are moving along the same line of least resistance."

"And what will be the effect of this migration of industrial centers?"

"The nation does not lose by the transfer, but is, in fact, benefited. Though the place left may suffer temporarily and its population decrease, the whole population of the nation increases, as I have shown you, at a greater ratio, because the means of supplying the wants of the masses are made easier. Let me illustrate this by calling your attention to the summary of a table I have just completed, and which has not yet been made public. In 1870 I find that the Eastern States raised 90,829,000 bushels of corn, the Southern States 343,613,000 bushels, and the Western States 659,813,000. Now, in 1878, the Eastern States produced 104,998,200 bushels, an increase of about 14,000,000 bushels; the Southern States produced 314,729,600, a decrease of nearly 30,000,000 bushels; while the Western States produced 986,490,950, an increase of more than 300,000,000 bushels. In wheat the Eastern States have gone in the eight years from 34,000,000 bushels to 47,000,000; the Southern States from 33,000,000 to 40,000,000; the Western States from 168,000,000 to 332,000,000. While the Southern and Eastern States have kept on the even tenor of their way in the production of oats, the West has gone from 139,000,000 bushels in 1870 to 263,000,000 in 1878. This increase in production sufficiently explains the influx of the farming population into the West, but it does not explain the rapid development of manufacturing industries."

"Have you any facts bearing on that?"

"Yes," said Mr. Porter, smiling, "and I will give you a few. In 1878 the State of Illinois alone made as many rails as the whole United States did in 1860. The four States of Illinois, Wisconsin, Indiana and Kansas produced in 1878, 266,783 tons of rails, more than 30 per cent. of all the rails produced in that year in the United States. Already an immense iron-rail industry, second only to the relations between the Lake Superior iron regions and the vast bituminous coal fields of Indiana and Illinois. The increase of population on the shores of the great lakes within the past quarter of a century is without parallel in history. I have made a series of investigations of the manufacturing populations of the Western States (Ohio omitted), of the thirteen Southern States and of the six New England States, including New York, Pennsylvania and New Jersey. Having ascertained by the census figures of 1850, 1860 and 1870 the actual growth of the manufacturing population of each State, the percentage of growth for each decade was easily found out; then by taking the average decennial growth between 1850 and 1870 for the increase between 1870 and 1880, I have arrived at the following approximation:

	Eastern States.	Western States.	Southern States.
Number engaged in mfg. in 1850.....	666,661	58,947	109,866
Number engaged in mfg. in 1860.....	900,107	113,045	131,979
Number engaged in mfg. in 1870.....	1,273,808	368,621	186,470
Probable numerical increase for decade ending 1880.....	461,055	633,892	71,919
Probable number engaged in mfg. in 1880.....	1,734,863	994,512	258,389

"From this exhibit I find that the manufacturing population of the nine Western States increased from 58,947 in 1850 to 994,512 in 1880; in the Eastern States from 666,661 in 1850 to 1,734,863 in 1880, and in the Southern States from 109,866 to 258,389. Thus it is evident that the West is no longer given over to meat and grain, but has entered upon the manufacture of all articles into which wood and iron enter. It is my firm belief that the shores of the lakes will ultimately be the great iron districts of the continent. The ore of the Lake Superior region is floated cheaply to such points as Chicago and Milwaukee, and is manufactured there dismembered, or distributed through the interior of Illinois and neighboring States, to be brought into closer proximity to the coal. The preponderance of the lake shores or the interior will be determined mainly by the point to which economy of fuel can be carried in iron manufacture. Changes are constantly going on in our iron centers. The most important iron producing region in Ohio is now the Mahoning Valley. Formerly the Hanging Rock region in southern Ohio was the most important in that State. There the smelting was chiefly done by the aid of charcoal. The

introduction of mineral fuel diverted the pig iron business very largely from Hanging Rock to Mahoning Valley. Pennsylvania and Ohio owe their prominence in the manufacture of iron very largely to the use of Lake Superior iron ores. It is not generally known that more than one-fourth of all the ore used is from there. The production in the Lake Superior region in 1873 was 1,125,000 tons; in 1879 nearly 100,000 tons more. Since the revival of the iron business and the demand for Bessemer steel rails, the Lake Superior producers have been unable to supply the demand."

"Has the West made the best use of its facilities?"

"Illinois has; Missouri and Indiana, Michigan and Wisconsin, in my opinion, have not. Missouri produced in 1878 less than one half the pig iron it did in 1872; Indiana with its black coal (the best for smelting purposes) has practically done nothing. Her opportunity is not yet gone, to be sure, but her lack of enterprise in this direction is, to coin a word, most un-Western. Michigan has 24 blast furnaces, less than half of which were in operation at the beginning of 1879, while Wisconsin had only 5 out of 15 in operation."

"Where can pig iron be produced the most cheaply?"

"In the South. The cost of producing pig iron in the United States varies, according to location and quality of product, from \$15 to \$25 per ton. In the South labor and raw material are lower in price. There are 144 blast furnaces in the South, 39 rolling mills and steel works, and 48 forges and bloomeries. In the Western States there are 182 blast furnaces, 89 rolling mills and steel works, and only 24 forges and bloomeries."

"Do you find that the West has improved its opportunities in other branches of manufacture?"

"It has undoubtedly pushed the branches into which wood and iron enter to their fullest extent. Indiana is to-day sending wagons via England to South Africa; Michigan furniture is sent to Great Britain and sold 25 per cent. cheaper than it can be produced there; and in the manufacture of agricultural implements Illinois and its immediate vicinity excel the world. In a radius of about 200 miles around Chicago more agricultural implements are made than in any other section in the world."

"How has this remarkable increase affected the Eastern States?"

"In 1850 the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Delaware employed 3773 persons in manufacturing agricultural implements; in 1860 they employed 6324; in 1870, 9274, and, according to a carefully prepared estimate I have made, they now employ 12,460. Massachusetts actually employs less now than she did in 1850. This fact is proved by the census of Massachusetts for 1875, the most reliable of all public documents. Maine also employs less now than in 1850. Turning from the Eastern States to the Western States of Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas and Nebraska, I find that in 1850 the number of persons engaged in the manufacture of agricultural implements was 1588. In 1860 it had increased to 6543; in 1870 to 13,977, and I now put the number at 25,220. It is estimated by reliable authorities that last year Illinois produced \$27,727,000 worth of agricultural implements, an amount equal to half the production of the United States in 1870."

"Once having the lead, why did not the Eastern States keep it?"

"A more careful study," replied Mr. Porter, "of what Edward Atkinson calls 'the finer points,' combined with the cheaper food, cheaper homes and proximity to the raw materials, has given the West the lead in all industries into which wood and iron enter. The great improvements in the steam engine in the last decade, combined with the increased railroad advantages, tend to make great manufacturers less and less dependent on location, and more and more dependent on these 'finer points.' A Western man has given to the world the most important improvement of the century in a plough; every one knows what a Western man has done for the harvester. Reliable figures also show that the West is the best place for the mechanic. In the East his average yearly expenditures are \$670, and his earnings \$787; in the Middle States he earns \$985 and spends \$786; while in the Western States he can earn \$945 and his yearly expenditures are only \$714. Thus he can save \$231 in the West, \$180 in the Middle States, and only \$117 in the Eastern States. These inducements, with the additional chances of a home and land, constantly tend to depopulate the cities of the East, and add to the population of our broad prairies and flourishing little towns."

"What is the present financial condition of the West, as compared with other sections?"

"Two Western States have been guilty of repudiation, but the West, as a whole, compares very favorably with the East. The States are practically out of debt. Michigan has a debt of \$1,392,149; Indiana, \$3,614,783; Illinois, \$558,442; Wisconsin, \$2,252,057; Minnesota, \$300,000; Iowa, \$300,000; Missouri, \$16,758,000; Kansas, \$1,029,175; and Nebraska, \$549,267, making the total indebtedness of the West \$26,758,873. The debt of the nine Eastern States is \$88,068,268, and that of the 13 Southern States (after the recent wholesale repudiation), \$182,694,781. The South now owes \$100,000,000 more than the East, and the East \$42,000,000 more than the West. But in local debts the Eastern States, as might be supposed, show a sad pre-eminence. After a careful study of the subject for over a year, during which time I have collected all the figures in relation to local debt attainable, I approximate the local debt of the United States as follows: Eastern States, \$540,000,000; Western States, \$140,000,000; Southern States, \$183,000,000. It must be borne in mind that the East has about 33 1/2 per cent. more property than the West, but for all that the local debts of some of the Eastern States form yokes under which whole communities are bowed down, and in many cases bankruptcy and ruin stare them

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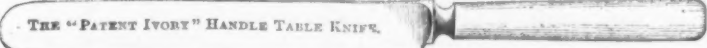
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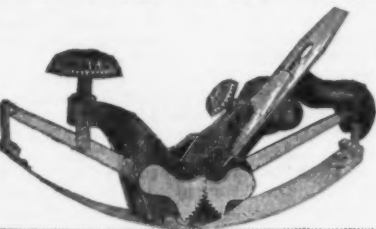
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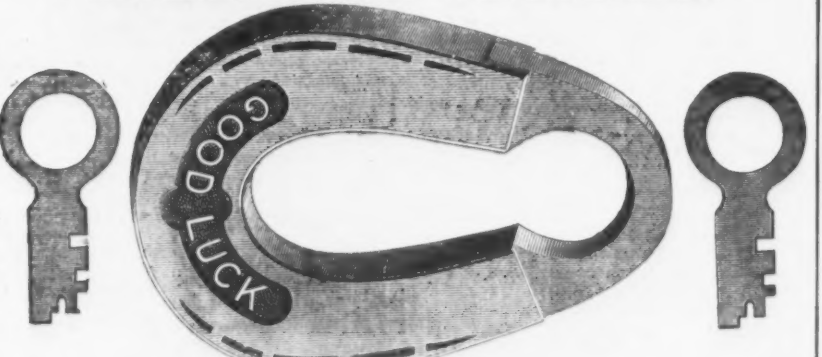
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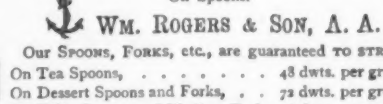
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Our Hollow Ware is plated upon the FINEST WHITE METAL, and is guaranteed to be plated fully 80 Per Cent. More Silver than any other brand of goods in the market.

OUR GOODS ARE PLATED 20 PER CENT. ABOVE STANDARD PLATE.

The above is a facsimile of our guarantee card which accompanies all goods.

THE HARTFORD.
Pat'd Sept. 23, 1879.



OUR GOODS ARE PLATED 20 PER CENT. ABOVE STANDARD PLATE.

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Electro Plated Ware, German Silver and Britannia Spoons.



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FORKS, SPOONS, Etc.,

Manufactured from Cast Steel, Plated with Nickel and Silver.

WALLACE BROTHERS, Wallingford, Conn.

LIGHTNING HAY KNIVES,
WEYMOUTH'S PATENT.

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits and parties once using it are unwilling to do without it. Its sales are fast increasing for exports as well as home trade, and it seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each, of 50 pounds weight, suitable for shipping by land or water to any part of the world.

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WESTON DYNAMO-ELECTRIC MACHINE
NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove work, giving a pure white deposit on plain or cast surfaces. Outfits on request, with Dynamo-Electric Machine Tanks, Anodes, Solution, etc., etc., \$250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

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Sole Agents NEWARK, N. J., U. S. A.
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Manufacturer of Copper and Iron
SASH CHAINS,
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in the face. It is safe to say that the last five years have developed a disposition in the West to pay up their obligations and have no more of them."

"Then the general outlook for the West is cheerful."

"In my opinion the entire Northwest will witness in the next five or ten years the greatest development it has ever known. The bountiful harvests for the past two years, the continued yield of precious metal in Colorado, coupled with the fact that at Leadville alone the output leaped from \$3,152,925 in 1878 to over \$11,000,000 in 1879, the unexpected facts in relation to the yield of wheat in the Red River country, and the pushing to completion of a hundred railroad projects, must have the effect of turning thousands Westward. Never were the times more propitious in Kansas, Nebraska, Minnesota and Iowa than now. Then there is Montana. Abundant snows that are now falling assure a fruitful season and an abundance of water for mining. The stock interests are growing, and they are to have several railroads in 1880, which will increase the population and wealth. I predict that the increase of emigration during 1880 will be greatly in excess of 54,000—the increase of 1879 over the previous year."

INDUSTRIAL ITEMS.

CONNECTICUT.

The Hartford Times says: The Hartford Foundry and Machine Company, in accordance with a vote of the stockholders, is still undergoing the process of being wound up. This company was organized as a joint stock concern in 1872, with a capital of \$72,000, with every prospect of enjoying a prosperous career; but the storm of 1873, that wrecked so many manufacturing establishments, crippled the young company, and the years of depression following made it impracticable to continue business. They are now selling off the machinery, stock and tools. Circulars, with a catalogue of the stuff for sale, have been sent all over the country, and purchasers from a long distance have been here buying articles at the appraisement. The largest and most valuable pieces of machinery have not been sold, and for the credit of Hartford it is to be hoped they will not be allowed to go elsewhere. Hartford capital should secure them and let them remain in the buildings where they now are, until, in the good time coming, the old Woodruff & Beach Works shall once more resound with the busy hum of industry. One of these machines is a huge pit lathe, capable of turning a pulley 30 feet in diameter and a 40-inch face. Another lathe—a horizontal one—will swing and turn a shaft of iron 6 feet in diameter and 40 feet long. It originally cost \$15,000. These machines should be kept here.

MASSACHUSETTS.

The Lawrence Co., Lowell, will soon put in a 1000-horse-power Corliss engine. The water works of the town of Plymouth have just been furnished with one of the Worthington compound condensing duplex pumping engines, with a capacity of 60,000 gallons per hour. This was put in operation the past week and is now furnishing the town with an ample quantity of water, and completely supplies the deficiency occasioned by the extra drain upon the works, resultant upon the starting up of the new Sawyer Woolen Mills.

The Kingston Co-operative Foundry Company have elected as directors: Henry B. Maglathin, J. H. Lent, Charles Lapham, H. G. Travis, William H. Myrick, Benjamin L. Sears and J. S. Chandler; clerk, J. H. Lent; treasurer, L. S. Cole; auditors, Walter H. Faunce and Pelham Manter.

The American Tack Company, of Fairhaven, have held their annual meeting, re-elected the old board of officers, and declared a dividend of 6 per cent.

The Lowell Machine Shop, of Lowell, will this spring enlarge their foundry so as to employ 25 more men.

The Douglas Ax Manufacturing Company, of Douglas, during the week ending January 17, finished more than 18,000 tools, the largest number ever finished there in one week.

The Putnam Machine Company, of Fitchburg, are building an addition to their iron foundry 50 x 36 feet, and will be prepared to increase the number of workmen in the early part of this month.

NEW JERSEY.

While the men employed in the tool room of Atha & Cox's steel works, at Newark, were at work a few days ago, a large emery wheel burst. The fragments were thrown in all directions. Thomas Kane's forehead was crushed in by one of the pieces, and he was instantly killed. The other employees escaped with little or no injury. The building was badly damaged.

The employees of the Cumberland Nail and Iron Works, at Bridgeton, are to have an increase in wages, dating from Feb. 1st.

Twenty-five hundred men and boys are now at work in the glass factories at Millville.

PENNSYLVANIA.

The Topton Furnace is now making No. 1 pig iron at the rate of 40 tons a day. The main difficulty experienced at present is the deficiency of ore and limestone, which cannot be promptly hauled to the railroad for transport.

The furnace at Port Kennedy, which was recently closed, is being put in trim to go into operation again as soon as possible. The furnace stack is being cleared out, a new boiler has been ordered, and the boiler house, which was blown to atoms, will be rebuilt at once.

The Temple Iron Company's furnace is in full blast and turns out No. 1 iron. The average is 200 tons Nos. 1 and 2 iron per week. They have large orders yet to fill.

The Clymer Iron Company expect to put their furnace into blast shortly. They are fast finishing their railroad bed, so that they can take their coal and ore direct to the furnace from the Pines.

The rolling mill of the Lehigh Zinc Company, Bethlehem, was shut down last week. The mill will be closed for an indefinite period. The low price of rolled zinc is the cause assigned, it being more profitable to sell the spelter than to sell zinc.

The increased demand for railroad loco-

motives on the Pennsylvania road has made it necessary to place three more engines on each track in the erecting shops at Altoona, so that repairs can be made on 18 engines at one time instead of 14, as heretofore. An extra force of men has been employed by the company for the purpose of breaking up condemned locomotives.

The cause of the stoppage of the Warwick Furnace was the wearing out of the bosh and lining, which have to be replaced entire. The furnace has been in blast two years and three weeks, and in that time has made 37,400 tons of iron. During 1879 the yield was 19,387½ tons.

The Phoenix Iron Company's furnace No. 2 has just been blown in after being idle five years.

The Central Foundry and Machine Shop, Reading, is full of work at present. Machinery is being made for a number of hat factories. A large planer has just been placed in the machine shop and other improvements have been added. The machine shop has been running about 15 hours a day during the past month.

At the Co-operative Foundry, Beaver Falls, an extra force of hands are employed, and orders are coming in fast. Among those lately received is one for four car loads of stoves, which has since been doubled, the parties ordering also agreeing to pay any advance in iron that may be made.

The Whitten mill, Conshohocken, Pa., was sold at public sale to Alan Wood & Co., for \$22,500. It is the only mill at present idle in Conshohocken, and will be leased to a manufacturer as soon as possible.

Work was resumed at the Schuylkill steam forge at Douglassville last night, after having been idle since the 21st of December for general repairs. A large number of orders have been received, and three turns of hands will be employed, and thus the forge will be in operation day and night.

The A. T. Wolf Stove Works, of Beaver Falls, are behind their orders, and are building an addition to their present works.

PITTSBURGH AND VICINITY.

Some of the mills are stopped for want of coal.

The Lucy Furnaces are now receiving a large cargo of Spanish ore.

The Crescent Steel Works are building a large two-story brick addition to their ware-room. The extension is 60 feet long and 34 feet wide.

The Curdy Tank Works are receiving 400 tons of tank iron, which is manufactured at Graff & Bennett's mill, at Millvale. Five 80-ton tanks have been ordered for Philadelphia, one for Long Island and three for New Jersey.

The Morgantown New Dominion says it is reported there that the gentlemen who have been prospecting in the vicinity of Laurel Iron Works have made extensive purchases there, and will begin operations at Pridevale next spring. The story is supplemented by a report that the purchasers invested on the promise of the railroad company that the Southwest road should be built to that place next summer.

H. C. Frick & Co. are building about 80 new ovens between Morgan's works and Broadford.

Chess, Smyth & Co. have raised the wages of the tackers 20 per cent.

OHIO.

Scioto Furnace is cutting 14,000 cords. She has not been out of blast during the last five years longer than necessary to put in a new hearth. She has 6000 tons of ore on hand. During the calendar year 1879 she made 3500 tons of iron on an average of 160 bushels of charcoal.

Hamden Furnace will make a 3000-ton blast this year. The experiments to dephosphorize its 9 foot ore vein have not as yet proved a practical success.

Wellston Furnace has been thoroughly remodeled (13½-foot bosh), and will start within a month.

Brown, Bonnell & Co.'s new rolling mill, at Youngstown, just completed, was put in operation Monday last for a trial test of the machinery. The mill is constructed in the shape of an L; is 173 feet long, 80 feet wide at the base of the L, and 70 at the ends. It is 53 feet to the top of the ventilator, sheet iron roof, well constructed, with iron braces inside. The machinery consists of a Buckeye engine, cylinder 28 x 60 inches, built by McIntosh, Hemphill & Co., Pittsburgh, which runs a train of three-high 7-inch muck rolls, with coffee-mill squeezers, a 20-inch bar mill, three-high roughing rolls and two-high finishing rolls. This mill is intended to make a specialty of manufacturing fish plate. At the north end of the mill, close to the straightening bench, there is a punch which is to punch the holes and cut the plate to the desired size with one motion. There are 14 puddling furnaces and three heating furnaces in this mill, with steel boilers attached, manufactured by W. B. Follock & Co. These furnaces have a large fan and model blast connections. This mill, it is understood, will give employment to 150 additional men. The puddling department began operations Tuesday morning, and it is expected that the bar mill will go on about Thursday morning.

ILLINOIS.

A Joliet telegram says orders have been received from the Joliet Steel Company to make immediate preparations for operating the blast furnaces and merchant steel mill (formerly the iron rail mill) of the company in Joliet. They have lain idle since 1873. The south furnace will be started first. Its capacity is about 70 tons of Bessemer pig iron per day, valued at about \$4000. The other furnace will be got ready at once. Workmen are now putting in the fire bricks and preparing the hot-air retorts. Lake Superior ore will be principally used.

KENTUCKY.

Iron Hill's furnace blew in on the 27th ult.

It is apprehended by persons well informed in labor movements, that the present year in the coal region will not be as free from strikes as the past three years have been. A significant step was taken recently at Forestville, in the western part of Schuylkill County, in the revival of the old Workmen's Benevolent Association, which was crushed out by Mr. Gowen in 1875. The new lodge already numbers nearly 100 members, and it is reported that others are organizing in different parts of the region.

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BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

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Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

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GUN WADS, Black and Pink Edge,

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F. C. Trimmed Edge, W. Proof.
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Musket, Paper and Tin Boxes.
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PAPER and BRASS SHOT SHELLS.

PAPER.

Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

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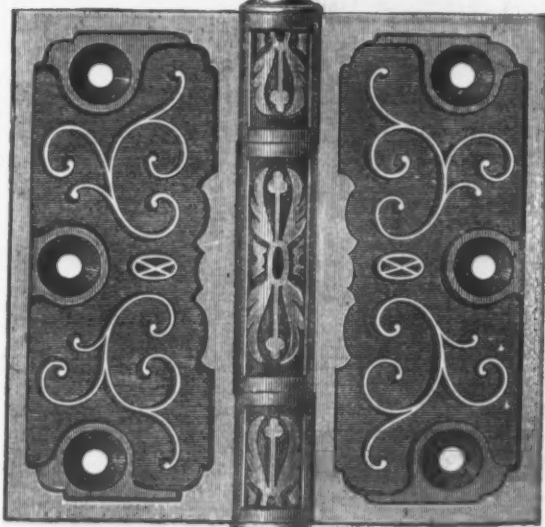


Flanders' Improved Locomotive Cylinder Boring Machine.
Bar and screw of cast steel, with two extra cutter heads. Manufactured and for sale by the
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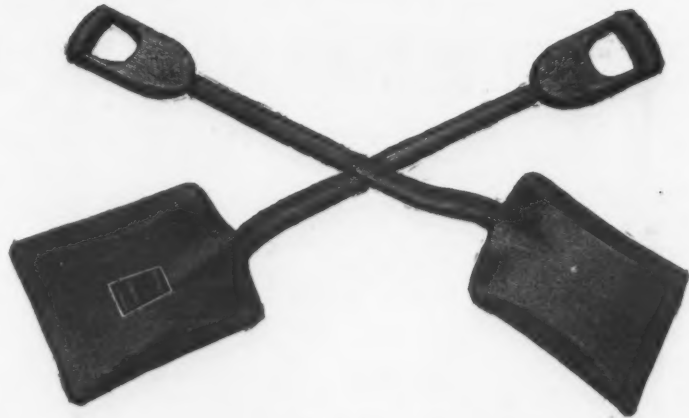


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SHOVELS,
SPADES and
SCOOPS.

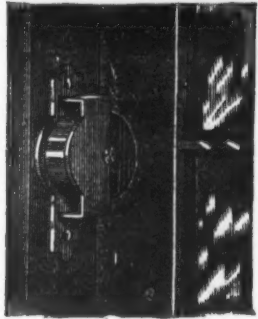
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Dwellings, Cars, Steamboats, &c.

The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter how great the jar or how old the sash. As shown in cut, it consists of a rubber wheel in a nickel-plated or brass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

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ADAPTED TO MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Machine Belting,
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Grain Elevator
Belting,
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Piston-Rod
Packing,
Gaskets and Rings.



Vacuum Pump
Valves,
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Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Wringer Rolls,
Billiard Cushions,
Grain Drill Tubes,
Emery Wheels.

This company manufactures the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than twelve years, also those for Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the Largest Belts in the World! We are now making an Elevator Belt, 36 inches wide and 200 feet in length, which will weigh over 15,000 pounds.

LINEN and COTTON HOSE.

Pat. 6545.

Plain and Rubber Lined.

Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbonized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.



"TEST" HOSE.

"CABLE" ANTISEPTIC.

Emery Wheels and Packing.



ORIGINAL
Solid Vulcanite
EMERY WHEELS

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

Pat. Jan. 26, 1879.

PATENT ELASTIC

Pat. Jan. 26, 1879.

Rubber Back Square Packing

BEST IN THE WORLD.

For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.

A represents that part of the packing which, when in use, is in contact with the Piston rod. B the elastic back, which keeps the part A against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

Corrugated Rubber Mats and Matting,

Pat. 11,208, 213, 207.

Pat. July, 1879.

For Halls, Flooring, Stone and Iron Stairways, &c.



This practical and indispensable article—especially for wear where exposed to ice, snow, or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

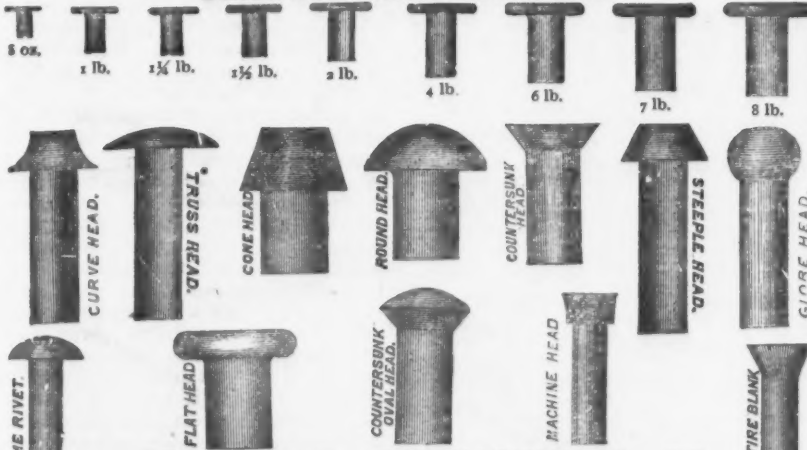


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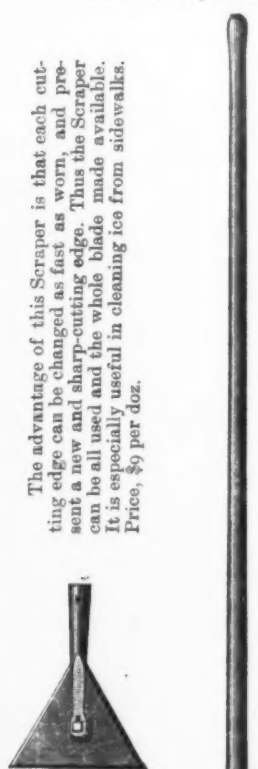
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The advantage of this Scraper is that each cutting edge can be changed as fast as worn, and present a new and sharp-cutting edge. Thus the Scraper can be all used and the whole blade made available. It is especially useful in cleaning ice from sidewalks. Price, \$9 per doz.



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Hawking Beets, Hawking and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also

COTTON AND BALE HOOKS.

Patented Feb. 13, 1877; a new combination of Hooks.

456 E. Houston St., New York City.



Western Stern-Wheel Boats.

An Ohio correspondent writes to us voluminously concerning the stern-wheeler, which is now the predominant type on the Mississippi River, or, rather, on its tributaries. This style of craft a few years ago was considered too slow, but of late great improvements have been made, and now in point of speed there is no essential difference between them and the side-wheel steamers. One of the most notable changes is the substitution of iron paddle wheels for wooden, especially on the upper Ohio, and a disposition to construct the entire hull of iron in some instances. For example, the iron stern-wheel steamer Chas. P. Choteau is one of the largest and most elegant on the Mississippi. New, powerful patterns of steel boilers are coming into general use among steamers of the better class. The chief recommendation for the stern-wheeler is the broad deck room, unbroken by wheel-houses or other accessories of a side-wheel boat. The cabins are situated on the upper deck, and in all cases where boats are employed in passenger transportation they extend the entire length, affording space for elegant saloon accommodation.

The two largest steamers of the stern-wheel class are the Golden City and Henry Frank, built at Cincinnati and of equal length, viz., 276 feet; but the former has 40 feet beam and 7 feet hold, while the Frank is 52 feet beam and 11 feet hold, with a capacity for 3000 tons, or almost double that of the Golden City. The Frank has six boilers, 28 feet long and 42 inches in diameter, and return flues. The engines have 9 feet stroke, 29 inches diameter and are high pressure, working a wheel 30 feet in diameter, with 29 feet length of buckets.

One of the most remarkable specimens of light-draft steamers is the stern wheeler Pittsburgh, recently built, and which is considered the swiftest of her class afloat. Her hull measures 252 feet in length, 39 feet beam, 6 feet depth of hold. She has three steel boilers of 70,000 pounds tensile strength, 47 inches diameter and 28 feet long, six-flued. The engines are of the common horizontal high-pressure lever type, working a wheel 21 feet in diameter, with 28 feet buckets. With stores and fuel aboard this boat draws only 24 inches of water, which is pronounced a "miracle in marine architecture," for a steamer that will carry 1000 tons and make 10 miles an hour up stream with a half cargo.

Among steamers of the side-wheel type not less worthy of notice, is the Bostonia, running from Cincinnati to Huntington, which has a length of 302 feet, four steel boilers, 30 feet long and 47 inches in diameter; engines with 25 inches diameter and 8 feet stroke, driving 27 feet side wheels of 16 feet face. The swiftest boats on the Ohio will carry 450 tons on 4 feet of water. The Guiding Star has run 17 miles an hour with 1400 tons of cargo, and the J. M. White, the most powerful boat on Western waters, and considered one of the fastest, is mentioned as worthy of comparison with any on the Hudson River. Her hull is 320 feet long, 50 feet beam and 11.6 feet hold. There are ten boilers of steel, 34 feet long and 42 inches in diameter, which furnish steam for two monster horizontal engines, 44 inches in diameter, with 11-foot stroke, working water wheels 44 feet in diameter, with 19 feet face. The White, however, is high pressure, carrying 175 pounds of steam. When the new Albany day-boat, recently launched, goes into service next spring, affording opportunity for a comparison of the relative advantages of iron and wood (though the Albany boat in some sense will be a composite steamer), the subject of steamboat construction will appropriately come into notice again.

English and American Hardware.

At a recent meeting of the Manchester Scientific and Mechanical Society, Mr. F. Smith, who on a former occasion spoke strongly on the subject of the comparative merits of English and American hardware, returned to the matter. He is reported by the English press as having said that since his first discourse a number of samples of builders' hardware had been sent to him by both American and English makers, and some of these he laid before the meeting. After describing the various samples, in which he pointed out the superiority of the American over the English article, Mr. Smith said that, as he had not a personal knowledge of the rules of the various trade unions in the lock districts, he was not prepared to assess the value of the statement made by some people to the effect that much of the inferiority of the English goods was to be attributed to the absurd and anti-progressive action of the unions. But he failed to see how they could be justly held responsible for inferior castings, bad jappanning, and clumsy design. For a long time English manufacturers, having had command of both their own and foreign markets, had been masters of the situation, and the result had been, first, a laxity in the supervision of the process of manufacture. So long as the article produced by the "garret master" brought profit to his principal, the clumsy, wasteful "rule of thumb" process by which it was produced was not considered, and if the late depression had given manufacturers time to think, they might say, "Sweet are the uses of adversity." Secondly, this abundance of work, if he was rightly informed, had led, in many cases, to the buying up and suppressing of improvements; and, thirdly, this great demand had led manufacturers to lose sight of the quality of their goods, and to enter into competition with each other to produce a low-priced article. After condemning the pestilent fallacy which was often raised, "our customers demand these worthless goods," Mr. Smith said that if they wanted to get an idea of how English national prosperity was influenced by the quality of the goods we manufactured, they had only to consider the position held by certain firms. Why should a Chubb's lock or a Whitworth lathe command higher prices than even the good work of less-known firms? Simply because the name guaranteed the quality, and when the same could be said of English goods generally, we should be in a fair way to "enjoy them again." Another and most important

factor in the sum of dead weights under which they had to stagger was their absurd patent laws, and if their legislators had set out with the intention of suppressing the inventive genius of the country, they could not have succeeded more completely than they had done. In order that they might improve their goods, it seemed to him that they must discard many of their old and obsolete patterns; they must adopt a method of founding which would secure a clean casting; they must copy the Americans in the employment of mechanics and artists, one to arrange the mechanical portions of the work and the other to design suitable and artistic form; they must look far more to their reputation for good and honest work, and must agitate for such an alteration of their patent laws as would place it in the power of the skillful artisan to protect the fruit of his brains at a reasonable cost. In conclusion, he believed there was enterprise and skill sufficient among English workmen and manufacturers to enable them to recover much of their lost ground, and the samples of English goods which he had displayed that night showed a marked advance upon those of three or four years back, while the prices were low enough to secure a sale, although in some cases a better article could be produced at the same cost.

Cleopatra's Needle.

A communication from Capt. Gorrington to the New York World, dated Alexandria, January 10th, gives the following information of interest:

After some trouble with the timbers to be used in blocking, the obelisk was secured on the blocking and the work of bringing it down to the sea level is gradually and successfully going on.

It is to-day within 12 feet of the level from which it will be launched, and there it must remain until the foundations of the constructions and of the pedestal have all been cleared away. To remove the foundations of the constructions has been a great piece of work as it must have been to construct them. To deal with the pedestal is also a very serious matter. It is formed of white granite blocks weighing from four to five and a half tons each. The two upper steps are hewn out of single pieces of white granite, and there are six pieces in all.

Inclosed in these are three other blocks, two of white granite and one of red granite, the whole bound together with iron or steel "dogs" with a lead rim around them exactly similar to those with which similar structures are secured to-day. The iron is in perfect preservation, and so far as I can judge it is better than any iron we make to-day, for while it is as hard as steel, it is as ductile as the softest wrought iron. There can be no doubt as to the age of the iron, for the "dogs" must have been put into position before the pedestal was placed on the foundation. Beneath the blocks above mentioned are others inclosed by and secured for the lower step in the same manner. The whole structure is a worthy foundation for what rested on it, and as it would really be impossible to improve on any part of it, I am removing everything with great care, and intend to transport the pieces and replace them exactly as I found them. The white granite is itself a curiosity. It is a kind of granite with which I am not familiar. Of course the removal and preservation intact of such heavy pieces will require time and close personal care and supervision.

A dispatch from Berlin says the borings in the Hanover petroleum region are now 60 feet deep, and the existence of a basin as large and rich as any in Pennsylvania is regarded as beyond doubt by mining experts. The deepest borings already yield 4 cwts. of oil per well daily, and as the oil is becoming more and more inflammable as the bore approaches the basin, the discovery of a European oil district may be pronounced impending. The borings are exclusively in the hands of Hamburg and Bremen firms engaged in the American trade. It is commonly supposed that petroleum is a modern discovery; but it was known in the time of Alexander, though the ancients made no use of the find. The following is a most interesting passage: "For a Macedonian called Proxenus, that had charge of the King's carriage (baggage), as he digged in a certain place by the river of Oxus, to set up the king's tent and his lodging, he found a certain fat and oily vein, which, after they had drawn out the first, there came out also another clearer, which differed nothing, neither in smell, taste, nor savour from natural oil, having the gloss and fatness so like as there could be discerned no difference between them; the which was so much more to be wondered at, because in all that country there were no olives." (Sir T. North, tr. of Plutarch's "Lives;" ed. 1631, p. 702.) This passage is more than curious, for it may be useful. If there was rock-oil beside the Oxus in Alexander's time, there is probably some there still. It might almost be worth while to go and see; and if any one should there "strike oil," let him thank Plutarch for his good fortune.

The following, which is told on the authority of a well-known dealer in machinery, is characteristic of that "conservatism" among British manufacturers of which we have heard so much during the past few years: An American firm sold a bolt-cutting machine, to go to Manchester, which would do more than double the work of the English machines. Full instructions were sent for its operation, so that no error could be made, and in due time word was received that the tool was at work and highly approved. Some months afterward one of the firm who made the machine was at Manchester and went to see the tool. To his surprise, he found it not doing more than half the work it should, and not at all up to its capacity. On inquiring why they did not make the machine work faster, he was told that it would not do; it was running as fast as their English machines ran then, and a higher speed would result in its destruction. He finally persuaded the operators to drive the machine up to its regular rate, which, after many objections, they did; but at last accounts they were still asserting that it would speedily destroy itself in daily work.

The Iron Age

AND
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The imports and exports of France for 1879 have just been published. They are briefly as follows: Imports—Food, 1,823,600,000 francs; raw materials, 1,226,601,000 francs; manufactures, 420,918,000 francs; total, 4,594,837,000 francs. Exports—Manu-
factures, 1,735,491,000 francs; raw materials and food, 1,254,193,000 francs; mis-
cellaneous, 173,406,000 francs; total, 3,163,090,000 francs. Compared with the return of the previous year, it shows an increase under imports of 418,000,000 francs, and a diminution under exports of 16,000,000 francs. The chief source of increase under imports is, of course, the item of food, which shows an advance on 1878 of 368,000,000 francs. There has also been a small advance in the importation of raw materials amounting to 41,000,000 francs. The slight diminution of the exports of last year on those of 1878 is confined to manufactured articles.

A suit of much interest and importance to the mercantile community has just been decided in New Orleans. It appears that the standing of an irresponsible commercial firm was rated very high by the mercantile agency of R. G. Dun & Co. Schmidt & Seigler, of New Orleans, asked for a special report on the firm in question, which was given, but the defendants failed to inform

the plaintiffs that the information commu-
nicated had been obtained from the mem-
bers of the firm in question. Relying
on the favorable report made by the agency,
Schmidt & Seigler sold the firm a bill of
goods, and when they found themselves un-
able to collect the amount due, brought suit
against the agency. The verdict gave them
\$1000. The case is important for the reason
that, if the verdict is sustained by the
higher courts, it will establish the responsi-
bility of mercantile agencies for losses re-
sulting to their clients by reason of erro-
neous reports and failure to use due dili-
gence.

The German Tariff and the Iron Trade.

In no civilized country have commerce
and manufactures been put to so severe a
test by wide and sudden fluctuations in tariffs
as in Germany. The question of free trade
or protection has been treated by those in
power as one in which the only interests de-
ciding the course to be taken were those of
political expediency. The unparalleled ad-
vance of the political power of the nation
—due to an admirable, though severe, mili-
tary system, and shrewd diplomatic manage-
ment—have introduced many elements into
the discussion of the tariff policy of the gov-
ernment which tend to obscure it. From
1818 to 1865 Prussia adhered strictly to the
principle of protecting and fostering home
industry by import duties on foreign manu-
factured goods, but in 1865 Bismarck for-
sook the ancient traditions and initiated a
system which approached free trade as
closely as possible. The rapid succession of
the two great wars of 1866 and 1870-71
naturally involved an exceptional state of
affairs, and the destruction caused by them,
together with the distribution of the gold
paid by France, led to a period of inflation
which affected all branches of industry, and
appeared to be chiefly favorable to the iron
trade, which was in receipt of enormous or-
ders for the construction of new strategic
lines of railway, war material, &c. Prices
rose rapidly, and Germany, unprotected as
it was, became a very profitable market for
the manufacturers of adjoining states. The
result was that imports of all classes of
goods rose enormously. It is estimated that
the value of finished products introduced from
other countries, which could have been
made in Germany if protected by a tariff,
has amounted to a sum at least equal to
that received a few years ago from France.

Indirectly it has, therefore, been expended
for improvements for which the materials
were furnished by foreign manufacturers.
When, therefore, the temporary demand
subsided, German manufacturers were left
to struggle against an enormous bulk of
cheap goods for which foreign countries—
notably England, which had lost very im-
portant markets (for instance, our own)—
had no other outlet. A period of depression
followed, which culminated in the adoption
of a protective tariff. While all the provi-
sions of the law passed on the 15th of July,
1879, did not go into effect until the 1st of
January, 1880, some portions went into
operation at once and others on the 1st of
October, and the effect produced may, there-
fore, be traced to a certain extent even at
this early date, and as the iron trade ap-
pears to have been one of the first industries
to recover, some data will possess interest.

In the Siegen district prices of pig have
risen in a short time from 50 to 85 marks
per metric ton, and in Silesia an advance
has taken place from 45 to 70 marks, while
coke and ore have in some cases appreciated
at a greater rate. This improvement has
been attributed by some to a demand on the
part of the United States; but when it is
remembered how largely this has been over-
rated in the case of England, it will be
readily understood how insignificant the di-
rect effect of some shipments of old iron
and scrap from Germany has been upon the
iron trade of that country.

It is evident that one of the main causes
of the revival of the German iron trade has
been the reintroduction of the duty on iron,
low as it is. This is clearly reflected in the
returns of imports and exports, some of
which are published in the *Annalen für
Gewerbe u. Bauwesen*.

For the first three quarters of 1879 the
imports of pig iron into Germany were
respectively 104,917, 189,957 and 32,516
metric tons. It might be urged that this
sudden decline is really due to the fact that
German consumers and speculators bought
foreign, notably Scotch and Cleveland pig,
in anticipation of the passage of the tariff,
and that therefore the stocks in Germany
were ample enough to meet the demands of
the trade. It would be idle to deny that to
a certain extent this is true, but it cannot
even in part account for the sudden falling
off in the demand for some time after the
passage of the tariff. We know from the
returns of the British Board of Trade that
this shrinkage of the trade with Germany
has continued during the fourth quarter of
the year, and it is only necessary to state
that, compared with the 32,516 tons im-
ported during the third quarter of 1879, the
foreign supply for 1878 and 1877 was re-
spectively 132,740 and 156,895 tons, or be-
tween five and six times as great. On the
other hand, the exports of German pig have
continued since the passage of the tariff
with little abatement. During the second
quarter of 1879 the exports of pig were
110,945 tons, against 97,917 tons during the
third, which, however, was greater by
11,400 tons and 6850 tons compared
with the corresponding periods in 1878

and 1877. A similar state of affairs is
shown by the leading manufactures of iron.
The imports of scrap were only 1757
tons during the third quarter of 1879, against
10,877 tons during the second, and 8495
metric tons during the first quarter. The
exports amounted to 7458 tons during the
third quarter, against 5958 tons during the
second of 1879, and 11,255 tons during the
third of 1878. The figures for bar iron and
various shapes, for plates, locomotives, ma-
chinery, &c., show that those articles too
were affected in a similar manner. There
can be no doubt, therefore, that even at the
present juncture the importations of iron
and steel into the German Empire have been
checked, and that the amounts formerly
drawn from other countries are now manu-
factured in German works, thus increasing
the business of establishments already at
work, and giving employment to works
which have been lying idle for some years.
It is likely that the coming year will more
emphatically exhibit this change, as the
duty on pig went into effect only during the
course of the second quarter of the last
year, while that in manufactures of iron
was in force during the third quarter only.
Their effect is strongly marked by the con-
trast with the highest grades of goods made
from iron and steel, the duty on which was
not changed by the law of July 15, 1879.
While, as we have seen, the imports of the
bulk of iron manufactures have declined,
these goods have remained stationary, and in
some cases have advanced a little as regards
the products left without an increased protec-
tion. The beneficial effect of the tariff is,
therefore, clearly shown, even at this early
date, and there is every prospect that the
German iron trade will with its aid enter
upon a period of prosperity of which it sorely
stands in need.

Canadian Trade.

Whether the Dominion of Canada, which
has suffered extreme depression in its indus-
tries and trade since 1873, will prosper under
the tariff which so seriously interferes with
her trade with the United States, is a ques-
tion which cannot soon be determined. How-
ever, as it is a matter of much interest to
a large class of our readers, we have been
at some pains to gather statistics of Cana-
dian population, wealth and trade which
will aid in forming an intelligent opinion as
to the industrial and commercial future of
the country.

AREA AND POPULATION OF THE DOMINION OF CANADA IN 1871 (LAST CENSUS.)

Provinces.	Square Miles.	Population.
Ontario.....	1,077,880	1,600,851
Quebec.....	1,933,355	1,191,516
New Brunswick.....	27,389	285,594
Nova Scotia.....	14,731	337,800
Manitoba.....	12,798	12,798
Prince Edward's Island.....	2,133	34,086
British Columbia.....	356,000	33,587
North West Territory.....	2,650,000	60,500
Total.....	3,372,400	3,686,596

The nationalities represented in the Do-
minion population are made up as follows:

French.....	1,688,940	Scandinavian.....	1,623
Irish.....	846,414	Italian.....	1,935
English.....	706,366	Black.....	21,497
Scottish.....	549,940	Indians.....	94,163
German.....	302,921	Other national- ities & races.....	139,222
Dutch.....	29,068		
Welsh.....	7,273		
Swiss.....	2,962		
Total.....	3,686,596		

The chief cities are:

Montreal.....	107,225	Hamilton.....	26,716
Quebec.....	59,699	Ottawa.....	21,545
Toronto.....	46,092	London.....	15,846
Halifax.....	29,582	Kingston.....	12,407
St. John's.....	28,803		

Immigration has developed as follows:

1871.....	27,773	1874.....	39,373
1872.....	36,578	1875.....	27,382
1873.....	36,090	1876.....	25,533

There passed through Canada, aside from
the above bona fide settlers, in 1872, 52,608
persons; in 1873, 49,059, and in 1874, 40-
649. There immigrated from the United
States in 1873, 8971 individuals, and 14,110
in 1874.

It is safe to estimate the present population
of the Dominion at 4,000,000. Trade has,
meanwhile, fluctuated a good deal, with a
steady excess of import over export.

CANADIAN IMPORT AND EXPORT, MERCHANDISE ONLY.

Fiscal year.	Import.	Export, dom.	Excess of import and foreign.
1871.....	\$85,047,432	\$74,173,618	\$10,873,814
1872.....	107,209,117	85,639,663	21,569,454
1873.....	127,514,594	80,789,922	46,724,672
1874.....	127,404,109	80,351,928	47,052,181
1875.....	119,618,657	77,886,978	41,731,679
1876.....	94,733,263	80,966,435	13,766,828
1877.....	94,320,483	75,875,393	18,445,090
1878.....	91,199,577	79,323,667	11,875,910
Total.....	\$851,427,297	\$650,007,604	\$201,419,693

IMPORT AND EXPORT BY PROVINCES.

Fiscal Year Ended June 30, 1878.	Import.	Export.
Ontario.....	\$3,628,697	\$2,937,466
Quebec.....	31,063,335	27,399,287
Nova Scotia.....	8,180,750	7,500,783
New Brunswick.....	8,474,047	6,268,027
Manitoba.....	1,171,113	728,868
British Columbia.....	2,776,103	2,776,860
Prince Edward's Island.....	1,393,225	1,700,752
Northwestern Territory.....	118,307	.....
Total.....	\$91,199,577	\$79,323,667

It is not easy to account for the enormous
excess of imports over exports, unless we
admit the theory that a great portion of the
imports by sea has found its way out of the
country across the frontier.

DOMESTIC EXPORTS OF THE DOMINION OF CANADA— MERCHANDISE ONLY.

Fiscal year.	1877.	1878.
Mineral products.....	\$3,628,958	\$2,869,363
Fisheries.....	5,874,360	6,020,300
Forest.....	2,656,587	2,024,692
Animals & other produce.....	15,361,051	14,577,089
Agricultural.....	16,279,726	27,281,089
Manufactures.....	4,681,750	4,715,756
Miscellaneous articles.....	414,547	477,593
Total.....	\$72,975,988	\$77,005,112

Particulars of the Export of 1877.

Mineral products.....	\$854,068
Coal & lignite, &c.....	1,180,075
Petroleum.....	900,542
Copper, silver, iron and lead ores.....	402,041
Other products.....	354,332
Total.....	\$3,628,958

Fisheries.....	5,721,253
Oils.....	120,785
Sealskins, &c.....	32,286
Forest.....	22,538,117
Timbers, lumber, &c.....	3,073,400
Pot and pearl ashes.....	471,832
Other products of forests.....	655,338
Animals and animal mat- ter.....	2,138,106
Live animals.....	600,000
Butter.....	122,514
Cheese.....	3,748,575
Eggs.....	534,891
Hog produce.....	2,096,777
Pure.....	1,229,757
Wool.....	698,974
Other animal matter.....	1,747,562
Agricultural.....	11,882,089
Onions and potatoes.....	1,460,550
Other cereals & veget.....	5,937,085
Manufactures.....	4,681,750
Miscellaneous articles.....	474,547
Total.....	\$72,975,988

IMPORT INTO THE DOMINION IN 1877.

Breadstuffs.....	\$14,415,000
Liquors.....	1,050,000
Colonial produce.....	10,245,000
Coal.....	1,005,000
Metals and manufactures thereof.....	5,020,000
Hides, skins and horse hair.....	600,000
Textiles.....	600,000
Wood and woodware.....	10,400,000
Dry goods.....	10,050,000
Other manufactures.....	360,000
Drugs and resin.....	29,030,483
Other goods.....	.....
Total.....	\$95,300,483

The following have been the countries
dealt with:

CANADA'S FOREIGN TRADE.

	1876.	1877.
Great Britain.....	\$7,431,180	\$5,941,539
United States.....	45,631,739	25,244,598
France.....	1,386,003	359,391
Germany.....	399,326	229,314
Spain.....	277,429	47,816
Portugal.....	41,913	114,028
Italy.....	53,146	151,561
Holland.....	219,014	53,750
Belgium.....	255,694	49,093
Newfoundland.....	672,665	2,004,682
British West Indies.....	578,405	1,951,144
Spanish West Indies.....	417,178	1,029,949
French West Indies.....	21,686	246,738
Other West Indies.....	16,580	127,458
South America.....	15,447	654,337
China and Japan.....	38,676	428,268
Switzerland.....	61,178	.....
South Africa.....	45,019	46,068
Other countries.....	299,135	665,292
Total.....	\$91,199,577	\$79,323,667

EXPORT OF CANADIAN MANUFACTURES.

1871.....	\$2,201,351	1875.....	\$3,900,219
1872.....	2,389,435	1876.....	5,767,747
1873.....	2,621,802	1877.....	4,681,750
1874.....	2,353,663	1878.....	4,715,777

It will be seen that the export of manu-
factures has increased materially, stimu-
lated, no doubt, by the lower prices ruling
since the panic. The following table shows
the nature of the goods:

Canadian manufactures exported during
the fiscal year 1878:

Woolen sailing vessels.....	\$1,236,145
Leather.....	364,745
Woodware and furniture.....	131,417
Sewing machines.....	273,734
Wines and liquors.....	240,420

makers. It is not hoops that are imported, as a piece of hoop iron is not a hoop until it is riveted together. If it ceases to become hoop iron as soon as it is cut to length and has a hole punched in one end, what is it when a hole is punched in the other end and it is bent round and riveted? Justice to the manufacturers of the country, justice to their workmen and justice to the revenue demands that this evasion of the law shall no longer continue, but that the plain, evident meaning of the statute shall be followed, and these large importations of hoop iron be forced to pay the duty provided by law.

Bisulphide of Carbon Motors.

Every few years the subject of generating power from the vapor of bisulphide of carbon attracts the attention of a certain class of experimenters in mechanics, and, as the result, we have more or less frequent announcements that results have been attained and economies secured which must inevitably throw the steam engine out of use and effect "a mechanical revolution." Probably the science of steam engineering would not be "revolutionized" so often if it were not so easy to secure large sums of money from credulous capitalists, who are always ready to take hold of a Keeley motor or a Payne electro-motor on faith, but who would not buy a house without proving it or a diamond without the judgment of an expert as to its value and size. Because these wonderful inventions do not effect the revolution in steam engineering which their inventors promise, but gently drop out of sight and memory, it does not imply that they are all swindles and frauds. In some instances they are, but more often the inventor believes in himself and his work, and never fully understands why he fails where he expected such magnificent success.

The latest attempt to obtain by the use of bisulphide of carbon the theoretical economy which long ago attracted the notice of experimenters, was announced with loud proclamation, and, upon investigation, seems to be more deserving of critical notice than many which have preceded it. The plan is to use bisulphide of carbon in the place of water, from which to generate an elastic vapor to drive an engine. One of the great advantages of the liquid lies in the fact that it boils at a comparatively low temperature, and that for a small increase in temperature the vapor has a high pressure. The use of bisulphide of carbon alone for the production of power is by no means new, and many experiments have been made with it which were not altogether satisfactory. One of its chief disadvantages was found in its very remarkable affinity for oil, or fat of any kind. This rendered the question of lubrication a somewhat difficult one. Leakage past stuffing boxes also caused some annoyance and danger, as the vapor of bisulphide of carbon is very inflammable. For a variety of reasons the use of this substance as a means for obtaining power has been abandoned, and is not considered even a hopeful one by engineers.

The inventors of the latest method of using it have very ingeniously avoided some of the more prominent of the difficulties, and have apparently taken an entirely new direction. The engine used does not differ in any essential from the ordinary low pressure engine with a surface condenser. The boiler is of the usual type. In operation it is filled about half full with water, and on top of this is an equal quantity of petroleum according to the original plan. In practice, however, only a few gallons of petroleum are used. When at work the water is heated almost to the boiling point, the pump is then set to work and a small quantity of the bisulphide of carbon is thrown into the boiler, where it at once absorbs heat from the water and is converted into vapor. The pressure can be regulated to suit circumstances simply by the action of the pump, as none of the liquid is allowed to remain in the boiler. The petroleum at once saturates the bisulphide of carbon and thus destroys its great affinity for the lubricants, while for all the internal rubbing surfaces the bisulphide of carbon carries a great supply of oil along with it, either in the form of spray or vapor. After having passed through the engine in the usual way, the vapor is carried by the exhaust pipe to the condenser, when it is at once condensed and falls into the reservoir from which the feed pump gets its supply. The amount of latent heat is considerably less than that of water, and hence a comparatively small condenser may be employed. Very considerable pressures are obtainable without heating the water in the boiler to the boiling point. Under ordinary circumstances only a small quantity of the bisulphide of carbon is used at a time in the boiler, most of it being in the condenser and hot well. One hundred pounds, it is stated, would be an ample supply for a 15-horsepower engine. Of this the greater portion would be required to fill pipes, pumps and connections. The market price of the material is about 15 cents per pound at present, but it is supposed that by taking large quantities it could be obtained for 10 cents or even less. In the foregoing we have endeavored to give as fair a statement as possible of the inventors' claims.

While a great many, if not all, the points claimed by the inventors are good, there are some others which require careful attention and are not favorable. The first of these is that the vapor of bisulphide of car-

bon is extremely inflammable, and when mixed with air it forms a very explosive compound. Some years ago an inventor experimenting with a bisulphide of carbon engine was blown across the engine room when he attempted to examine the inside of the cylinder with a lighted candle. The cylinder head had been taken off, and the vapor within had become mixed with enough air to make a very explosive compound, which was fired by the light. The liquid itself has an exceedingly foul and suffocating odor, which makes it very disagreeable to most people.

One of the great points of advantage claimed by the inventors is the economy, which they assert may be as great as 75 per cent. over an ordinary steam engine. Theoretically this may be possible in some cases. Indeed, if we arrange a bisulphide of carbon engine and a steam engine so that the exhaust steam of the latter heats the boiler containing the bisulphide of carbon, it is possible to obtain a horse-power with a consumption of only one pound of coal per hour. This arrangement, however, necessitates a very great degree of complication and heavy first cost in proportion to the amount of power obtained. The inventors in this case do not contemplate this, and do not propose to introduce double vapor engines. Of course when confined the vapor does not affect the external air, but unfortunately all engines will leak, and, so far as we know, all vapors or gases under pressure pass through stuffing boxes and small openings easier than steam. We may expect, therefore, that the bisulphide of carbon vapor will leak more easily than steam. The loss may be small, but the annoyance will be great. These are very serious objections, and it is doubtful whether a condensing engine driven by means of bisulphide of carbon vapor, under ordinary conditions, will show any considerable economy. While the vapor gives great and easily controllable pressures, it must be remembered that condensers and air pumps must be provided for all high-pressure engines before they can be made to use it. It is true that these condensers may be smaller than for steam, but still they are necessary, and are only about one-third smaller than would be needed for steam. We may say that all practical machinists and engineers who have worked with bisulphide of carbon engines have very little hope for the success of any experiments with it; and while there is still room for experiment, with a possibility that some of the difficulties now regarded as insuperable may in time be removed, the prospect is certainly a very discouraging one.

California Freight War.

The struggle among those who compete for the transportation of goods between the Atlantic States and the Pacific Coast has suddenly assumed a new phase. Just at the moment when merchants supposed that all hands had agreed to a truce, trade being left to its natural course, it turns out that the overland railroad companies and the Pacific Mail Steamship Company have been engaged in vain endeavors to harmonize their interests under a new combination, similar to that previously existing, when rates all round were advanced and strenuous efforts made to prevent shipments around the Horn. The rupture at last is complete, as appears from the following circular:

PACIFIC MAIL STEAMSHIP COMPANY.
NEW YORK, January 29, 1880.
To Shippers of Freight to California.—DEAR SIRS: You are hereby notified that, on and after the 1st of February, this company will be prepared to name rates of freight from New York to San Francisco, via Isthmus of Panama, and to contract for same with shippers for the term of twelve months from that date. For rates of freight and further information, apply to H. J. Bulley, superintendent, at office of the company, foot of Canal street, North River, New York.

By order of the Board.
President Riley, when called upon by our reporter, stated, in substance, that it had been impossible to reconcile differences, and now the steamers of the Pacific Mail line would run independently, at such low rates of freight that they could not fail to do a large business, and they would take passengers at a reduction of 30 per cent. from the old schedule. The reporter suggested that the Union Pacific Railroad Company professed to fear nothing from the competition via Panama, as the steamships on the route were already carrying almost to their full capacity, and would be unable to do a larger business should it be offered. In reply, the president remarked that his company would be amply provided with steamers equal to the largest demand, and he had no misgivings in regard to the course which had been resolved upon.

It will be remembered that in the freight war of last year the Union Pacific Railroad Company used the Panama steamers for coastwise freights, in opposition to sailing vessels going round the Horn. Now, it is understood among the clipper-ship folks that the steamers will raise the rates on coastwise freights to economize space, and reduce the rates on the higher classes of merchandise, giving a better average than before and returning a better net income. It is reported among those in the trade that the Pacific Mail Company refused to renew the arrangement under which they received \$60,000 a month, and demanded \$100,000, which was rejected. At a later date, when the railroad company were inclined to accede to these terms, the Pacific Mail was "off." Then \$150,000 was demanded and \$125,000 offered, at which point negotiations ceased. This is the story. As yet the overland rates

remain without change, and merchants are curiously asking what will come next. The clipper-ship owners look on complacently, feeling sure of coastwise freights in any event, which they can afford to take at low rates while going out for grain.

The Lake Superior iron ore companies and the Iron Mountain Company of Missouri, have fixed the price of ore for the season of 1880. The Republic Company, of Lake Superior, have named \$12.50 on docks at Cleveland, or other Lake Erie ports, for their specular, \$12.50 for the magnetic and \$11 for their Kingston ore. From \$12 to \$12.50 is the asking price for the Lake Superior hard ores, and \$10 for the soft hematites. The Iron Mountain ore is held at \$15 per ton at St. Louis. These, we believe, are the highest prices ever asked for a season's delivery of either ore, although some odd lots or some portion of the output may have been sold during one or two years for a little higher figure. The contracts for the season's delivery, however, have never equaled these rates. The vital question is, Can these prices be obtained? The producers say they can, and they allude in justification of their position to the report that the Iron Mountain Company can readily sell their entire output at the rate named, and then not supply the demands of their regular customers upon them. The Republic Company state that the applications from their regular customers are largely in excess of their supply. The quantity they offer (150,000 tons) includes 120,000 tons of specular, 17,000 tons of magnetic and 13,000 tons of Kingston ore. The other mines producing hard ore tell much the same story, the demand for this class for fix arising from the increased make of puddled iron and from the requirements of blast furnaces, which, with our method of hard blowing, must have hard ores, even though a portion of soft ore may be used. These facts render it probable that there will be a market for all the hard ores that will be produced in the West, and there is but little doubt that these ores will be readily sold and that the contracts will be made at once. With the soft ore it will be different. The bulk of the increase in the output of the Lake Superior regions will be directed to this class, and it is questionable if it will be possible to maintain the present prices. At least there will not be the same anxiety to place orders, and the chances of the future will be taken by many furnaces.

It will be a cause of great regret that the new French cable has already been crowded to the wall by the competition of the Anglo-American Company, which met the announcement of its opening with a reduction in rates from 75 cents to 12½ cents a word. The 12½ cent rate is too low and would ruin any company which should attempt to do business at it for any length of time. The Anglo-American Company could not stand it long, but they are presumably in a better shape to lose money than a new line just opened to business. What the managers of the new line will do is still uncertain. Since they are prevented by the conditions under which they enjoy the privilege of landing their cable on our shores from making an alliance with other cable companies, they seem to be forced to a choice between "the devil and the deep sea," literally. Their only course seems to be to fight it out, and meet the 12½ cent rate until the Anglo-American people are tired of it. It is an unpleasant, but perhaps an inevitable, alternative.

The Steel Rail Hearing.

WASHINGTON, D. C., Feb. 3, 1880.

About two weeks since the Chairman of the Committee of Ways and Means notified Mr. D. J. Morrell, president of the Cambria Iron Works, who was in this city, that the Committee would grant a hearing on Feb. 2 to parties desiring to speak on the proposed reduction of the duty on steel rails from \$25 to \$10 per ton. A large number of gentlemen interested in the manufacture of steel were present at the rooms of the committee at the time indicated and heard the argument of H. V. Poor in favor of the reduction. Among the gentlemen present were D. J. Morrell, of the Cambria Iron Works; Dr. Linderman and Joseph Wharton, of the Bethlehem Iron Company; S. M. Felton, of the Pennsylvania Steel Co.; Andrew Carnegie, of the Edgar Thomson Steel Works, Pittsburgh; O. W. Potter and S. P. Burt, of the North Chicago Rolling Mill; W. W. Scranton, of the Lackawanna Iron and Coal Co.; A. J. Leith, of Joliet, Ill.; D. H. Mason, of Chicago; Chester Griswold, of Troy, and Mr. Elliott. Mr. Poor stated that he represented a number of railroads interested in the purchase of steel rails, among these the New York Central, the Illinois Central and the Texas and Mobile railroads. He said that the iron and steel manufacturers had been receiving exceptional protection for 10 years, and that the time had now come to reduce the protection on steel rails in order to cheapen them to all railroads. He urged that if the tariff was reduced, foreign as well as American, rails could be bought at lower figures. He then entered at great length into an historical dissertation upon the railroad system of the United States for almost half a century. He was frequently interrupted by Messrs. Conger, Frye, Garfield, Tucker, Kelley, Mills and Dannel of the committee, whose questions excited replies which went to show that the duty of \$25 a ton had not produced the injurious consequences represented by Mr. Poor.

A letter from William P. Shinn, of the Vulcan Iron Works, St. Louis, was read in which that gentleman advanced arguments in favor of the present duty. Emory Storrs,

of Chicago, and James F. Wilson, of Iowa, will represent the steel interest in favor of the maintenance of the duty at its present figure. Members of the committee, commenting upon Mr. Poor's argument, expressed the opinion that one object it had in view was to defend Mr. Vanderbilt from the charges made against him for his purchase of foreign steel rails, and that the principal object of the bill pending in committee was to release that purchase from duty, and with it similar contracts made for the future with foreign manufacturers.

The National Association of Stove Manufacturers.

The ninth annual meeting of the National Association of Stove Manufacturers began yesterday (Wednesday) at the Fifth Avenue Hotel, in this city. Gen. Rathbone, of Albany, president, was in the chair. The first day's session was largely taken up in listening to papers by Mr. John S. Perry, of Albany, Mr. B. F. Holbrook, of St. Louis, and Mr. J. R. Chapin, of Buffalo. A ballot for officers resulted in the following election of officers for the ensuing year:

President.—Gen. JOHN F. RATHBONE.
Vice-Presidents.—R. P. MEYERS and G. F. FILLEY.

Treasurer.—A. BRADLEY.
Secretary.—EDWARD BOWDITCH.

Board of Managers.—JOHN S. PERRY, W. H. TEFPT, JOSHUA JEWETT, I. B. RESOR, W. P. ABENDROT.

Standing Committee on Patents.—ISAAC A. SHEPPARD, CHAS. A. MCLEOD, MILES FRATT, G. G. WOLFE, J. L. MOTT.

The attendance was very large, and great interest was manifested in view of the high price of iron and the relatively low price of stoves. The important business of the meeting comes in to-day's session, when it is probable some basis of prices will be agreed upon which will make the business more fairly remunerative than it has been since the advance in prices began. This is regarded as the most important meeting of the Association since 1872, when the condition of trade was much the same as it is to-day.

Scotch Pig Iron.

As the bulk of the foreign pig thrown upon the American market at the present time is Scotch, many have been obliged to replenish their stocks from this source, although they have little or no knowledge of the metal they have purchased, and of the manner in which it may be used to best advantage. How far the absence of such knowledge may be regarded as giving rise to numerous complaints of the quality of foreign pig, we are not prepared to state, but it is likely that the uses of Scotch pig are not as fully understood now as they were ten or twenty years ago. It is to be regretted that a large and important industry like the Scotch iron trade has never sought to give consumers a better assurance of the value of its product. The example of a number of prominent smelters of the Rhenish provinces and Westphalia, Germany, who combined to show, by tests and analyses, that their product was at least equal to Scotch pig for the very purposes for which the latter was chiefly bought, ought to have stimulated the Scotch ironmasters to effort in the same direction. They cannot expect that occasional customers would be accurately informed as to the best method of using the metal purchased, and they should follow the example of many manufacturers engaged in other branches of industry, in giving as full and accurate an account of the properties of their goods as possible under the circumstances. All departments of the iron trade which furnish raw materials will, we believe, in time be forced to give mechanical, chemical and working tests of their product, and it is likely that the manufacturers of pig for foundry purposes will be forced to fall into line before long. A strong effort has been made in this country by a few ironmasters—for instance, the makers of the Salisbury pig—and it is a notable and suggestive fact that those who have led the way in this direction have been the ones whose product was already in the enjoyment of a well-earned and wide reputation for inferior quality. The value of well-planned tests is now generally understood, and it is likely that, as the demand for such information increases, the means of providing reliable and conclusive data will be greatly enlarged and fully developed.

The main features which commend Scotch iron to the founder is that it is very gray and of great fluidity, while its shrinkage is comparatively low. There are a large number of brands of Scotch pig, among which we would mention Coltness, Langloan and Summerlee, of which the two latter are little inferior to the first, which is considered the best brand of Scotch pig. A second class of iron which rate approximately equal to one another are Glengarnock, Gartsherrie, Carnbroe and Shotts, while Monkland and Govan are rather poor for foundry purposes, and are better adapted for forge purposes. Eglington is rated as fourth class pig. Within certain limits, of course, the quality of these brands necessarily varies, the metal produced during the summer months being harder than that made during the winter. We may add that old and shrewd Scotch founders express a strong preference for old pig; that is, metal which was made many years since. The following analyses, of which the first was made of Coltness No. 1 and the second of Langloan No. 1, may serve to give an idea of the chemical composition of Scotch pig of the better grade:

Coltness, Langloan, Scrap.			
	No.	Tonnage.	No.
Silicon	4.38	4,826,473	5.51
Phosphorus	0.08	0.75	0.02
Sulphur	0.03	0.04	0.03
Graphite	3.30	3.40	2.82
C. Carbon	0.20	0.46	0.58
Manganese	1.58	1.02	0.72
Copper	0.10	0.07	0.05
Iron	90.24	90.51	90.80

The average composition of Scotch pig has been stated by good authorities to be 2.5 to 4 per cent. of silicon, 3.5 to 4 per cent. of graphite, 1 to 1.5 per cent. of manganese and 0.8 to 1.0 per cent. of phosphorus. Some very interesting experiments were made some time since in Germany with Scotch pig, and from the records of these tests,

conducted by the late Herr Wachler, of Gleiwitz, we take the following data: Trial meltings of Coltness and Langloan pig, composed as given above, were melted with scrap from both, which contained the impurities enumerated in the above with 40 per cent. of this scrap. Coltness pig yielded a metal having a tensile strength of 8.40 tons per square inch, while with 50 and 60 per cent. of scrap, the figures were 8.69 and 9.43 tons respectively. Langloan pig was melted with 40, 50 and 60 per cent. of the same scrap and yielded metal having a tensile strength of 8.80, 8.85 and 10.31 tons per square inch respectively. The iron flowing very thin in each case. The higher grades of Scotch pig, which are produced by smelting calcined black band and pure red specular ores with raw coal, all melt easily and flow well, and they possess the valuable property of remaining gray even in thin sections, so that they are easily worked by machine tools. The cheaper grades have frequently an excessive amount of silicon, from 4 to 5 per cent., or their quality is impaired by too high a percentage of phosphorus. Scotch pig is, therefore, largely used in England, on the Continent and in this country, in order to counteract by its presence the injurious effects of other grades of metal. Its high percentage of uncombined or graphitic carbon makes it particularly suitable for mixing with light gray qualities of charcoal iron, or with old foundry scrap or sprues, of which it will carry considerable quantities. Melted by itself, No. 1 Scotch pig has a shrinkage of one part to 135 parts, or about eight-tenths of 1 per cent., which is a comparatively low figure.

Technical Education in Philadelphia.

The Philadelphia Ledger says: The Technical Schools of the Spring Garden Institute, Board and Spring Garden streets, were opened Monday evening without any ceremonies, the first class of 10 pupils being simply set at work "flat-tiling," under the instruction of Mr. John Hall, a practical mechanic. Dr. Robert Grimsdew has charge of the schools, under direction of a committee of the board, composed chiefly of practical mechanics, two of whom are foremen in the Baldwin Locomotive Works. As the school was somewhat of an experiment, only five double work benches were erected in a broad corridor on the third floor, giving accommodations for 30 pupils in three night classes of 10 each. Over 50 applications for admission have been received, however, and to apprentices in the Baldwin Works have formed a class among themselves, and desire to be admitted in a body as soon as accommodations can be furnished. It is probable, therefore, that the work-benches will be removed to a larger room on the floor, and new ones erected, giving accommodations for more pupils. Each bench is fitted with vices and furnished with tools, materials, &c., for the use of the pupils. Some of the vices and tools have been presented to the Institute by manufacturers desirous of encouraging the managers in organizing the school. The first course of instruction will include filing and chipping with all kinds of metal.

It is proposed to begin giving instruction in turning, forging and other branches of mechanical handiwork later in the year. There were exhibited at the school last evening, to encourage the pupils, wonderfully fine specimens of forged work, made by blacksmiths at Phoenixville, who were inspired to attempt this high class of work by foreign exhibits at the Centennial now in the possession of the Pennsylvania Museum and School of Industrial Art. Flower forms, wreaths of oak leaves and acorns, ornamental screens, &c., have been made of wrought iron under the hammer with such skill and delicacy of handling that they rank as works of art. Another class met at the Institute last evening for a first lesson and the third class meets this evening. Day classes are also to be organized. The pupils pay \$5 each for a course of instruction lasting 10 weeks, and are at no other expense for either tools or materials.

The Shipping Interests of the Lakes.

The lake commerce of this country is liable to be underestimated. A detailed statement just made at Chicago (Inter-Ocean) shows that no less than 3087 American vessels are at present afloat on the lakes. Only about one-ninth of these are owned at Chicago, 193 being claimed by Cuyahoga, 220 by Buffalo Creek and 546 by Champlain. In transportation it is shown that Escanaba surpasses all other ports in the shipments of iron ore, and that Duluth is rapidly advancing in commercial importance, having shipped 3,500,000 bushels of grain during the last season. The Inter-Ocean does not appear to think that comparisons are odious—at least to the lacustrine region—for it presents a table of clearances and arrivals showing that Chicago has had more than twice as many as New York during the season of lake navigation—May 1 to November 30. The following is this rather surprising table:

Arrivals and Clearances.			
	No.	Tonnage.	No.
New York	4,380	4,826,473	5,511
Boston	2,837	1,859,009	2,619
Baltimore	2,080	1,552,278	2,413
Philadelphia	1,902	1,260,652	1,590
Portland	607	410,516	527
Chicago	11,850	3,577,095	12,014

Strikes in England.—Mr. G. Phillips

Bevan has published his usual annual summary of strikes in the United Kingdom. In 1879 these numbered 327, as against 277 in 1878, and 191 in 1877. Only 16 of those of 1879 were legacies from the previous year, and 26 strikes are carried on to 1880, so that the number of trade disputes has largely increased. Perhaps the most interesting of the results deduced by Mr. Bevan is that which shows us how little men gain by such quarrels with masters. Of these strikes from which he was able to gather information, 3 were won by the men, 20 were compromised, 92 were lost, and 26 remain unsettled. Assuming these to be a fair representative average, the lesson ought to be instructive to those who are only too ready to listen to the voice of professional agitators.

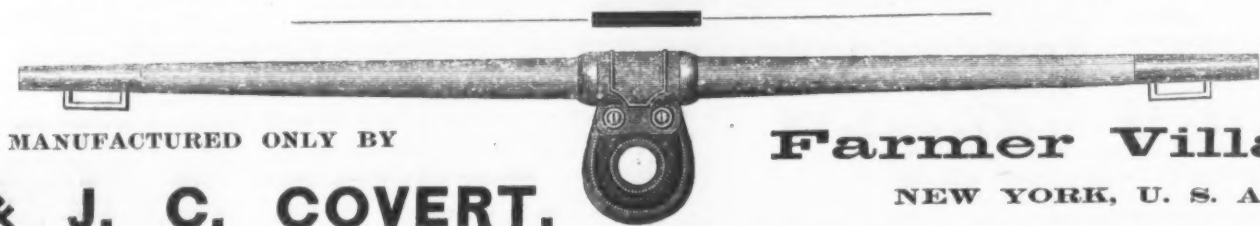


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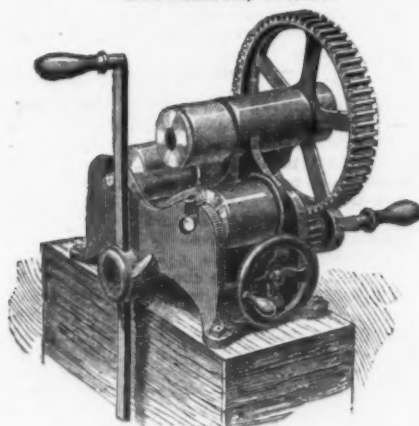
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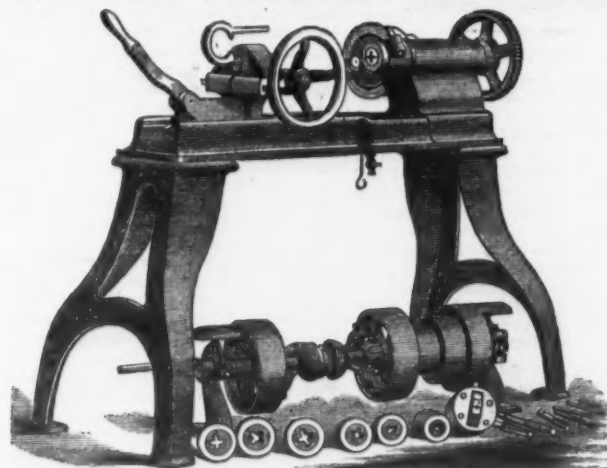
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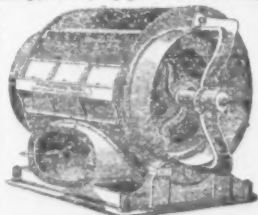


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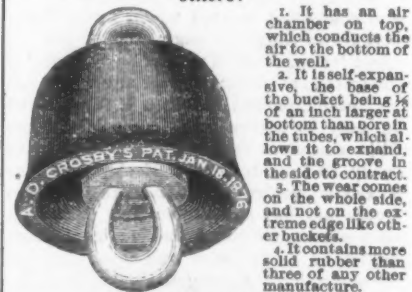
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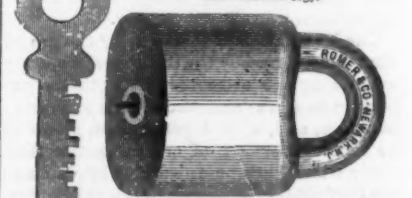


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2. It is self-expanding, the base of the bucket being 1/4 of an inch larger at bottom than at top, the tubes, which allow it to expand, and the groove in the side to contract.
3. The wear comes on the whole side, and not on the extreme edge like other buckets.
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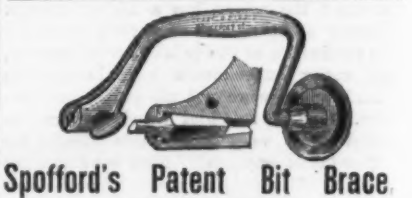
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No. 7... 7-inch sweep. No. 107... 7-inch sweep.
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No. 14... 14 " No. 114... 14 "

COBB & DREW,

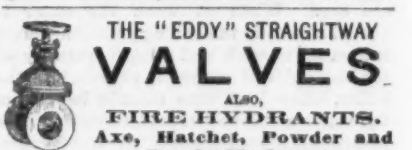
Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets; Common and Swedes Iron, Leathered, Carpet, Lace and Glass Tacks; Finishing, Hungarian, Trunk, Cloat and Cigar Box Nails etc. Rivets made to Order.

NEW YORK AGENCY.

George C. Grundy,
HARDWARE,
165 Greenwich Street

Agents for the Philadelphia Star Carriage and Tire Belts.



THE "EDDY" STRAIGHTWAY VALVES

ALSO,
FIRE HYDRANTS,
Axe, Hatchet, Powder and
Brush Machinery.

MOHAWK & HUDSON MFG. CO.,
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BENTON, FAULKNER & BIRD, N. Y. Agents.
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R. COOK & SONS,

Manufacturers of

Carriage & Wagon AXLES,

WINSTED, CONN.

ESTABLISHED 1839.

GEO. E. EMMONS,

MANUFACTURER OF

Scythe Rifles

OF A SUPERIOR QUALITY AND FINISH,
from Wellington Mills Emery, also from Hampton Emery. All goods warranted as represented. Send for Price List.

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The Sugar Maker's Friend.

Agents wanted in every sugar district to canvass for the sale of

Post's Patent Metallic Eureka Sap Spout and Bucket Raiser. Samples Circulars and Terms sent postpaid on receipt of 20 cents. Address

C. C. POST, Manufacturer and Patentee, Burlington, Vt. Call for them at your hardware stores.

BARBER'S PATENT COUNTERSINK.

Diploma awarded at Mechanics' Fair, Boston, 1878. Hole bored any depth, and countersunk for any size screw at one operation. \$2 per doz.; discount in quantity. D. F. BARBER, 1321 Washington St., Boston.

NEW YORK STATE AGRICULTURAL WORKS, Established 1830.

LA DORR'S



Jointed Pulverizing Harrow.



Eagle Rake.

WHEELER & MELICK COMPANY,

Patentees and Manufacturers of

Railway & Lever Horse Powers, Wheeler's Vibratory Threshers & Cleaners.

Ellis's One and Two-Horse Threshers and Cleaners, Threshers and Shakers, Straw-Preserving Rye Threshers, Eagle Hand and Horse Dumping Rake; La Dorr's Jointed Pulverizing Disc Harrow, the only Disc Harrow that will thoroughly pulverize the ground, leave it smooth and cover the seed; Tolley's Champion One and Two-Horse Cultivator with patent screw teeth Steam Engines, Dog and Pony Powers, Wood Sawing Machines, Shingle Machines; La Dorr's Disc Corn Cultivator, unequalled by anything for cultivating corn or any rowed crop. All machines made of first-class material, and are the best machines for export and home trade. Having been established nearly fifty years, our reputation is second to none.

Send for illustrated circular and report of Centennial Trial.

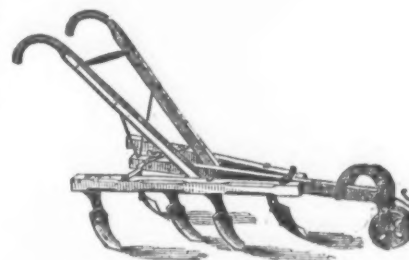
WHEELER & MELICK COMPANY,

Albany, N. Y., U. S. A.

WHEELER'S

MEDAL MACHINES.
NEW YORK STATE AGRICULTURAL WORKS.

Horse Power and Thresher and Cleaner.



Tolley's Champion Cultivator.

THE HARTFORD AUTOMATIC PUMP

Water Driven to any Height and Distance by Compressed Air.

Country Houses Supplied Cheaply and Certainly for Bath Rooms, Water Closets, Hot and Cold Water Faucets, &c.

Plenty of Fresh Water for Stock on Farms.

The Best Pump for Irrigating, Supplying Railroad Tanks and for Mining Purposes.

This pump is being introduced into all the foreign countries, and is accepted by all mechanical men as the very best Pump in the market. It is more durable and needs less repairs than any other apparatus for like purposes, and is therefore the cheapest in the end, if not at first. Its advantages over other Windmills, Rams, and other contrivances for raising water, are quickly seen. For Circular and Price List address

EZRA BROOKS, Manufacturer,

HARTFORD, CONN., U. S. A.



SEYMOUR'S SHEARS AND SCISSORS.

HENRY SEYMOUR CUTLERY CO.,

MANUFACTURERS OF

Full Nickel Plated and Maroon
Japan Handle

Shears & Scissors

EVERY PAIR WARRANTED.

Sold by Hardware dealers throughout the country.

Salesrooms,

84 and 86 Chambers Street, New York City.

Manufactory, HOLYOKE, MASS.



THE KIDDER SLIDE DOOR HANGER.

No Iron Rail and Cannot be thrown off the Track,

Thereby saving great annoyance to the user and cost of iron rail. The small anti-friction wheel keeps the door in place, preventing side friction. The Hanger can be put up in less time, runs with less noise and as easily as any other hanger made. For sale by the Wholesale trade generally, and the

KIDDER SLIDE DOOR HANGER CO., Romeo, Mich.



End View of Track.

Made of two pieces.

All Wood Track.

Patented April 30,
1878.Reissued July 8,
1879.

"The Diamond."

Cuts a round hole easily and quickly, and is made of such superior material that the blade does not become dull, as is the case with all round hole cutters introduced heretofore. The blade is readily adjusted to cut a circle from 2 1/2 to 3 1/2 inches in diameter.

CAN OPENERS.

The illustrations represent three different styles of Can Openers made by us. We desire to "close out" stock on hand and cease making. In lots of 10 gross and upward we will bill at very low prices.

SPRAGUE NOVELTY WORKS, Rochester, N. Y.



Iron Handle, "No. 5."



"American."

The Braunsdorf Electric Light.

Now that prosperity has overtaken many of the leading interests of this country, so suddenly that many manufacturers are not in a position to meet the demand upon their facilities unless they extend their working hours into the night, the question of providing for the illumination of large spaces in an efficient manner has become one of importance to them. The developments made in the last few years with illumination by electricity, therefore, assume much importance, and it will be of interest to place before our readers the details of an apparatus which is specially designed to meet this growing demand. It will be remembered that two methods of producing the electric light have been developed, the one being based upon the property of an electric current of heating intensely any portion of the conductor which offers it resistance, and the other depending upon its property to create a luminous arc if the circuit is interrupted entirely at any one point. To the former class, the lights by incandescence, belong the Edison, Sawyer, Mann and others, while the latter class includes the great number of systems using carbon rods. The Braunsdorf system, which we have had occasion to examine recently, is included in the latter, the light being produced by the passage of a strong current of electricity between the two points of carbon rods, kept apart at certain distance by an automatic regulator. The dynamo-electric machine used by Messrs. Braunsdorf & Co., shown in the accompanying illustration, consists of a pair of electro-magnets, between which an armature revolves. The latter consists of two series of thin plates, which alternate with one another. One system is so constructed that each plate bears 60 projections, which are separated by the thickness of the second series of plates. Three of these washer plates have inside projections, which serve as guides for the bobbins of wire, wound transversely, each

such lights are apt to mislead those unacquainted with the nature of the light produced by the voltaic arc. They create the impression that one light may suffice for the illumination of larger spaces, and have, we believe, largely contributed to disappointment in the results obtained by the use of strong electric lights. A limited area is usually flooded with light, while at a greater distance the effect is by no means satisfactory. As an illustration, we may state that a room 35 feet by 35 at the factory at Pearl River required for its illumination, which was far superior to that of gas, a machine rated at least 2500 candles, and using about 1½ horse-power. A long room in the shop, 260 feet by 35, was illuminated by five open lamps, each of which was equal to 5000 candles, and while the effect was highly satisfactory, it would have probably required two additional lamps to illuminate the space uniformly throughout and diffuse enough light to relieve dark shadows.

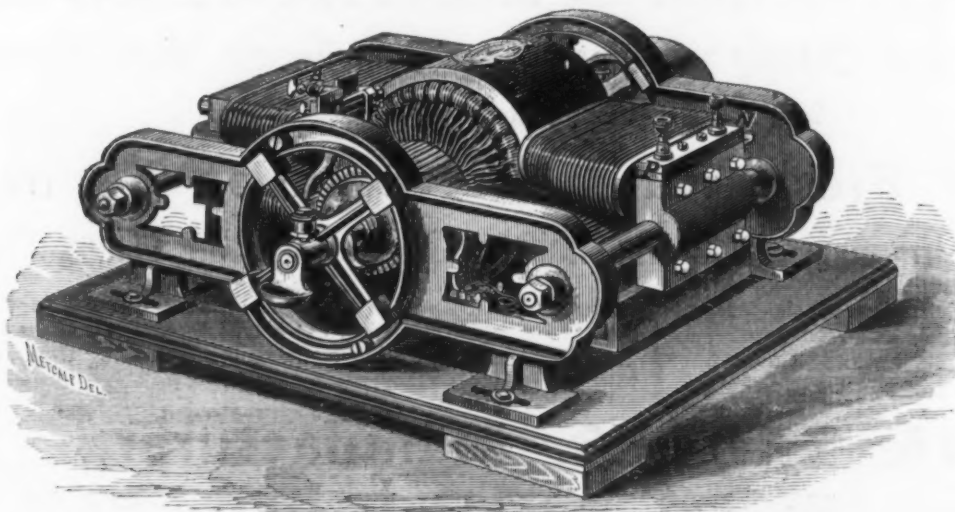
A Remarkable Spinning Machine.

A correspondent of the Louisville Evening Post and News tells the following story, which, if true, is of much interest, concerning a machine invented by one Clements, which spins yarn directly from seed cotton. This machine consists of a 35-inch top flat, self-stripping card; the attachment (which is a diminutive gin 18 x 18 x 36 inches) is substituted for the licker-in and feed rollers of the card; its saws are 7 inches in diameter, with 14 teeth to the inch, and revolves from 100 to 200 times per minute. The brush connected with the saws is a cylinder covered with bristles; its periphery revolves little faster than the saws, and has also a traverse or horizontal motion. The periphery of the card travels a little faster than the brush; a feed table is placed above the card and connected with the attachment by a shuttle, and gives a regular supply of seed cotton to the attachment. A stop-motion is used to save waste in case of ac-

attenuating qualities perfect; and the fact that it has never been nap, cut nor tangled by the gin, pressed, compressed, or permitted to become dry, seasoned and brittle in this tangled condition, nor has it been injured by the willower, lopper, double lopper, breaker and cards, where the damage done by the gin, press and compress are sought to be remedied. But these advantages, great as they are, are not half what are claimed for the "new process."

The ginning, baling, bagging and ties are saved; the seed inure to the manufacturers; no loss from falsely packed cotton, no strikes among operatives, for it is the poor man's factory, and his daughters are the operatives. The cost: The entire capital necessary for the smallest size new process mills, including building and motive power, is only \$3500, and will pay a net profit of 30 to 50 per cent. per annum. (See report of Westminster Mills, at Westminster, S. C.) It saves all expense, loss, waste, drayage, perquisites, general average accounts, stevedores and speculation, &c., on cotton in transit from the field to the factory, be that distance 15 or 15,000 miles, as from India to Manchester, England.

Take a bale of cotton on a farm near Corinth, Miss., and see the expenses, &c., in sending it via Memphis to Boston, Mass. Hauling to Corinth, sampling, weighing, deduction of from 2 to 4 pounds from each bale's actual weight, profits to purchaser, freight and insurance to Memphis, drayage to cotton shed, storage, insurance, dress sampling, commissions for selling, general average accounts, brokerage for buying, dress boring, second weighing, repairs, drayage to compress, compressing, drayage to steamer or depot, freight and insurance to Boston, loss on bills of exchange, &c. To these add waste, loss, damage, drayage and stevedores, all the expenses, speculations, &c., of the guerillas of the South and the great cotton kings of the North, also the expenses in our seaport towns (where it is, or was, or recompressed



THE BRAUNSDORF DYNAMO-ELECTRIC MACHINE.

one of which corresponds to the space between two projections. The length and the thickness of the insulated wires used for each bobbin vary with the size of the machine, and it is only necessary to note, in this connection, that the armature is exceptionally large for this class of dynamo-electric machine, and that the clearance between the revolving armature and the electro-magnets is very small. The object of constructing the armature in the manner outlined is to give the air access in order to cool it, and we have had occasion to convince ourselves that, after several hours running at a high speed, the machine was not heated to any injurious extent. The commutator is so constructed that it will run for long periods without showing any irregularity of surface, a result which has been aided by the recent introduction of spring plates instead of commutator brushes. These plates are furnished with a brass cross-piece, readily removed, and if worn, replaced at a small expense. Even if running at a high speed, very few sparks are visible in the commutator.

The lamp used by Messrs. Braunsdorf & Co. differs from the greater number of those constructed hitherto, chiefly in regard to the simplicity of the regulator mechanism. The carbons are held by simple sockets, the positive carbon being the upper one and the negative the lower. The upper carbon holder is a heavy brass rod, toothed for the greater portion of its length. The clock-work regulating its descent is controlled by a lever, to one arm of which is attached the armature of an electro-magnet. The lower negative carbon is withdrawn by simple mechanical means as soon as the armature is attracted. The exact movement can be regulated to suit the speed of the machine by a set-screw on the lever. Numerous experiments have been made in order to produce a satisfactory mixture for the material from which the carbons are made. The prepared mass is strongly compressed in a Ferris and Miles hydraulic press, which delivers the rods true to shape and of any desired length.

Messrs. Braunsdorf & Co. make a variety of dynamo-electric machines of different sizes and patterns, both upright and horizontal. The greater number are single circuit machines, but a few have been turned out for two circuits, capable of supplying electricity for two lamps. The largest, which is now building, has magnets weighing 200 lbs. for a light rated at 25,000 candles, which, it is estimated, will require 7 to 8 horse-power. We have had occasion to examine with apparatus in the possession of the manufacturers at their works at Pearl River, N. Y., a number of machines of different power. The smallest one made, costing \$50, and used chiefly for laboratory work, showed by photometric tests a power of at least 2000 candles, and required, running at 1500 revolutions per minute, about one horse-power. It is necessary to note, however, that statements as to the power of

incident. These, with a small drawing roller between the doffer and calendar rollers, to reduce the sliver to the ordinary working size, and a cam motion to receive said sliver, are all the changes and additions made to the card, and there are none made elsewhere. The seed cotton is spread upon the endless apron of the feed table, and passes thence through the shute into the attachment, where the lint is removed from the seed, and while on the fine saw teeth (after passing the ribs) passes through a set of combing plates, which removes all extraneous matter, and delivers the filaments to the brush, which delivers them to the card, and thence through the doffer, small drawing and calendar rollers, are delivered as perfect sliver into a revolving can.

By this process only four machines are necessary to convert any given amount of seed cotton into perfect yarns—viz.: card, as changed, drawing frame, s:ceder, and spinning frame. It is true a cleanser of seed cotton is used as a preparatory machine. Its size is 22 x 28 x 44 inches; cost, \$75; capacity, 6000 pounds of seed cotton per day; power necessary to drive, one-half of one horse.

The new process dispenses with fully one-half the building, machinery, motive power, and operatives hitherto necessary to convert any given amount of seed cotton into yarns; causes the card, with the same amount of motive power, to do five times as much work; saves one-half the usual waste, and produces stronger sliver rove and thread than can be made of baled cotton, which, on account of their extra strength, seldom break or let down, thereby enabling operatives to attend more machinery and each machine to do more work. The thread is equal in ever respect to that made of baled cotton, 50 per cent. stronger, and more sheeny.

The attachment supersedes the gin, press and compress, because they are intended and only used to render cotton transportable; the willower, lopper, double lopper, breaker, and four-fifths of the cards, because they are only used to try to remedy the injury done by the gin, press and compress; it supersedes the railway, railway drawing-head, also all jack frames, shubbers, mules, twisters, eveners, &c., simply because they are costly and unnecessary machines, and perfect thread can be made without them.

The reason why the card will do five times as much, using seed cotton and the same amount of motive power, as it did by the old process, using baled cotton, is because the filaments are not permitted to leave the machinery, fly or become tangled, but are kept straight and parallel, and are the straightening of the cotton filaments. The saving of one-half the usual waste is because fresh, live cotton is used, and half the usual machinery dispensed with. The extra strength of the thread and skein is owing to the working of the cotton fresh from the seed, the oil of which has kept it alive, light, elastic and flexible, with all its

to be shipped to Europe), the expenses and profits of the shipment, and the expenses after its arrival there until it is sold to the manufacturer. Now, if to all these you add the expenses and profits of the shipment, and the expenses after its arrival there until it is sold to the manufacturer; and if in addition you add the expenses, profits, &c., of the manufactured goods returned South, you will have some idea of what middlemen receive, and what the new process will save, when generally adopted, to our impoverished but still beloved South.

American Pumps in Australia.

At the late Exhibition of the Agricultural Society of New South Wales, a silver medal was awarded to the Hartford automatic pump, of which one of the smaller size was placed on exhibition. The jurors in their report say:

"To enable the judges to test the power of the automatic pump, the agents obtained the mayor's permission to erect the apparatus at Moore Park. The pump was placed in the lagoon on the north side of Cleveland street, and communicated by a half-inch air pipe 52 feet 6 inches long with the motive power, a small windmill erected on Mount Steel at a height of 87 feet 10 inches above the pump. A discharge pipe, 1 inch in diameter and 1172 feet long, was laid from the pump to the top of Mount Renny, rising to a height of 60 feet above the water level in the lagoon. Several outlets were provided in this pipe to test the quantity of water raised at the different heights.

"With a stiff breeze, the discharge of water at the top of Mount Renny was equal to 150 gallons per hour, but the discharge was considerably greater at the lower openings, which, when open, were running full bore with great pressure.

"We consider the trial of the Hartford automatic pump most satisfactory, and that the work performed by this apparatus is far greater than that done by any other pump for the power expended, particularly when the friction in a small pipe 1172 feet long, discharging at a height of 60 feet above the water-level, is taken into consideration.

"The motive power is a small windmill with fixed fans and rudder, strongly put together, which cannot easily get out of order, as the wind-wheel only compresses air, which forms an elastic resistance to the piston of the air-pump. This compressed air, pumped at each stroke into the submerged cylinder or buckets, is then used to force the water as required.

"The air pump is very simple in construction, and is inclosed in the iron standard supporting the wheel, so that no joints or moving parts are exposed to the weather. The compressed air is conducted by a small pipe to the two oscillating cylinders, or buckets, which are provided with valves at the bottom to admit water, and with a slide valve at the top. The air is forced into one

cylinder until the latter has a tendency to rise, the oscillation changing the slide-valve and allowing the compressed air to be instantly diverted to the opposite cylinder, forcing the water contained in it through the discharge pipe. When a certain amount of water has thus been expelled, this cylinder becoming higher than the other has a tendency to rise, and by its oscillation produces a continuous stream in the discharge pipe.

"The air pump is provided with a safety-valve, which is easily adjusted to raise the water to the height required.

"The Hartford automatic pump has been introduced in this colony by the agents, but we believe that it has been successfully used for some time in America. From the satisfactory result obtained at the trial at Moore Park this pump seems well adapted for raising water from deep wells, springs, rivers or swamps, without labor, for the irrigation or for the supply of farms and stations, or for public institutions in the interior.

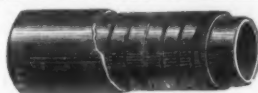
The Middlesex Company, Lowell, Mass., last month repeated their generous conduct of a year ago, and paid their help 5 per cent. dividend on their wages if they have been employed six months consecutively there.

The Riverside Glass Works, at Wellsburg, W. Va., commenced work on the 26th ult. They are running slowly, getting the molds into shape, and expect to be in good running order this week.

BUFFALO SCALE CO.,

BUFFALO, N. Y.

Manufacturers of
H. R. Track Scales, Hay Scales, Coal Scales, Grain Scales, Platform Scales, Counter Scales, &c.
Send for price list, stating what you want.



A. WYCKOFF,

Manufacturer of

Wyckoff Patent Wood Water and Gas Pipe,

STEAM PIPE CASING,

PUMP TUBE, &c.

Established 1855. Send for pamphlet.

ELMIRA, N. Y.

WILLIAM H. AINEY, Chairman.

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MELLERT FOUNDRY AND MACHINE COMPANY, Limited,

(Works Established at Reading, Pa., in 1848.)

Manufacturers of

CAST IRON

Water and Gas Pipe,

With special Castings, Flange Pipe, Water Gates, Fire Hydrants, Lamp Posts, &c. The Celebrated Canadian Turbine Water Wheel. Machinery and castings of every description for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, &c. Columns, Brackets, Iron Railings, &c.

ARNOLD MELLERT, Sup't, Reading, Pa.

THE

Positive Lubricator

Patented April 22, 1879.

Feed according to speed of shaft.
No drip, no danger of fire.
Cheapest and cleanest.
Warranted not to gum.

W. J. FAUL,

Patentee & Sole

Manufacturer,

218 Centre St.,

New York.

Send for circular.

TATE & COMPANY,

MANUFACTURERS OF

BRAIDED WIRE PICTURE CORD,

Also BONNET AND WAX FLOWER WIRE,

364 Atlantic Ave., Boston.

These goods were awarded the only premium at the last Exhibition of the Massachusetts Charitable Mechanic Association.

W. R. OSTRANDER,

Manufacturer of

PATENTED

Speaking Tube Whistles,

Bell Hangers' Hardware.

Send for revised catalogue.

19 Ann Street, New York.

ANCHOR BRAND

AXLES.

For all Styles Carriages and Wagons.

Annual production 150,000 sets.

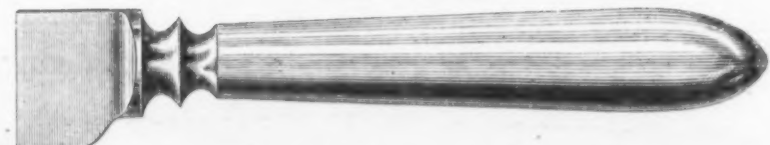
SHELDON & CO., Auburn, N. Y.

GREENFIELD TOOL CO.

(GREENFIELD CUTLERY CO.)

Greenfield, Mass., U. S. A.,

MANUFACTURERS OF



Fine Table Cutlery.

Solid Handled, Bone, Ivory, Rubber and Wood, Solid Steel Silver Plated.



PATENT CONCAVE FORGED OX SHOES.



ALSO,

PLANES, PLANE IRONS, &c.

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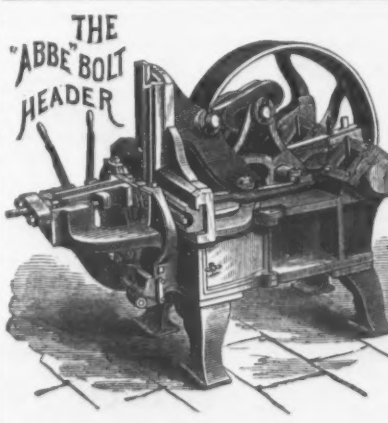
BAR, BAND & SHEET IRON,

T and Tram Railroad Iron, 10 lbs. to 40 lbs. per yard, and

DEAN & COLEMAN PATENT RAIL.

Office, No. 45 W. Main St., Mill Brook St.,

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THE "ABBE" PATENT Bolt Forging Machine.

Any Imaginable Shape of Head can be Produced.

All its working surfaces above the Water and Clinders. There are neither Gears, Cam or Springs—every motion being positive. For particulars address

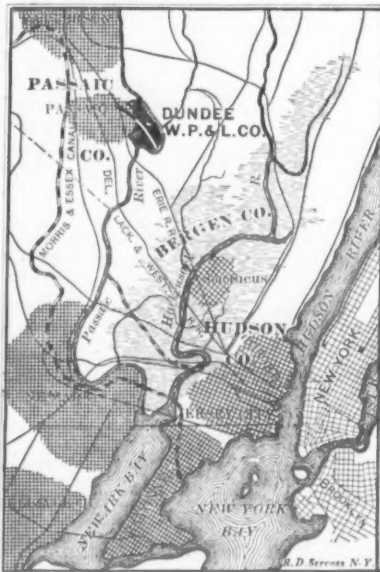
S. C. FORSAITH & CO., Manchester, N. H.

Also Manufacturers of

The "Pamer" Power Spring Hammer.

VALUABLE MANUFACTURING SITES TO LET. The Dundee Water Power and Land Company, OF PASSAIC, NEW JERSEY.

Offer to manufacturers one of the most desirable situations for the establishment of manufacturing industries in the United States, on most favorable terms.



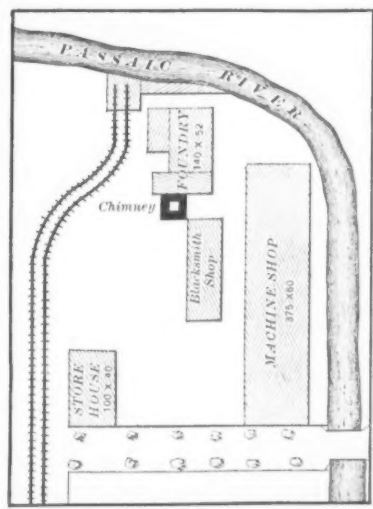
Map showing advantageous location of Passaic, N. J., as a manufacturing center.

The property of this company is located at Passaic, New Jersey, at the head of navigation of the Passaic River, only 12 miles from New York and 4 miles from Paterson. It is located directly on the line of the Erie Railroad. By means of a dam and canal, both constructed in the most permanent manner, the entire water power of the Passaic River is conducted to the company's mill sites, by which is obtained a fall of twenty-two feet. Competition by both river and rail insures the lowest rates of freight transportation, and the close proximity of several large manufacturing cities, viz.: New York, Paterson and Newark, secures a great advantage in respect to labor. There is at present in operation a dozen manufacturing establishments, giving employment to a large number of hands. The location is perfectly healthy, cost of living is cheap, and there are good churches and excellent schools. Cheap illuminating gas and healthy city water are also to be had. The permanency of the mill water power is assured. The water is delivered to each mill through a canal 80 feet wide.

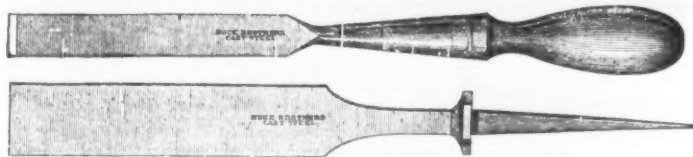
Among the manufacturing establishments at present located on this property are the New York Steam Engine Co.; Rittenhouse Manfg. Co., woolen mill; Messrs. Waterhouse Brothers; Bach & Sons, both woolens and flocks; Reid & Barry; Passaic Print Works.

The establishment of the New York Steam Engine Co. is now for sale owing to a dissolution of the company. The works comprise eight substantial one and two-story brick buildings, and consist of Manufacturing Shop, 75 feet by 60 feet; Foundry, 140 by 52 feet; Pattern Shop, 100 by 45 feet; Shop, 80 by 20 feet; Brass Foundry and Boiler Rooms, of about 20 by 20 feet each, together with additional smaller buildings, called the Power House, for 75-horse power turbine, and the Fire Engine House. These works are located directly on the Passaic River, with good depth of water. In every respect this location is particularly desirable for manufacturing purposes. Liberal terms will be made by the company with desirable parties. Full information will be furnished by mail or personally by application to

JOHN B. PUTNEY,
Sec'y D. W. P. & L. Co., PASSAIC, N. J.



Plan of the works of the New York Steam Engine Co., offered for sale.



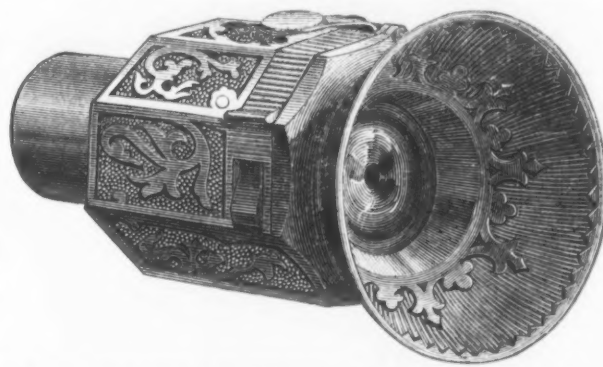
BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,
PLANE IRONS.

Gauges of all lengths and circles beveled inside and outside. Nail Sets, Scratch and Belt Awns, Chisel Handles. A full stock of Carving Tools. Also, small boxes of Tools of best quality.

PATENT
Elliptic Spring Whistles



FOR
SPEAKING TUBES.
Patented April 24th 1879.

We call the attention of the trade to the whistle for speaking tubes, represented in above cut, as being superior, in a mechanical point of view, on account of the

PATENT ELLIPTIC SPRING,

which is much less liable to break and get out of order than the spiral spring usually used. These whistles being made entirely of metal, are very strong and durable. They are offered in a variety of styles at very reasonable prices. Send for illustrated circular and quotations.

We also invite an examination of our **PATENT REVERSIBLE DOOR LOCKS**, which by their peculiar construction, combine simplicity, strength and durability. In these Locks the combination of the Patent Lever and Spring renders the latch movement very easy and prompt in action.

Illustrated catalogues and price lists furnished on application.

TRENTON LOCK AND HARDWARE CO.,

Manufacturers of Superior Building Hardware.

Trenton, N. J.

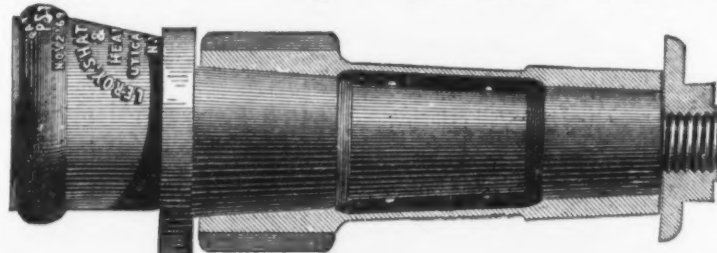
AGENTS.

JAMES M. VANCE & Co., 211 Market St., Philadelphia, Pa.; JAMES MARSHALL, 48 Warren St., New York.

LEROY, SHATTUCK & HEAD,

Manufacturers of

Carriage and Wagon Builders' Hardware,



AND

The Celebrated "UTICA" (xx) SKEINS AND BOXES.

TRADE

Also, we are Sole Manufacturers of the

PLUMB SPOKE TAPER SKEINS AND BOXES.

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43 sizes Common Skeins and Boxes. 21 sizes Double Extra Skeins and Boxes.

22 " Seamless " 22 " Brass Bearing " 22 " Rabbitt Bearing "

20 " Ex. Heavy " 18 sizes Old Taper Skeins and Boxes.

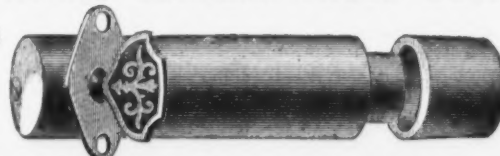
Furnace and Office, 105 BROAD STREET, UTICA, N. Y.

IVES' PATENT BURGLAR PROOF DOOR BOLT.

Can be applied

wholly by

boring.



Sure protection

against burglars

or tramps.

TO THE HARDWARE TRADE.—I invite the attention of the Hardware trade to my **PATENT DOOR BOLT.** Important features in this invention are its mode of application, sure protection and pleasing finish. Put up in boxes, one dozen each, nickel plate and bronze.

Agents, **GRAHAM & HAINES, 113 Chambers St., New York.**
A. T. YOUNG, 36 Pearl street, Boston; J. LATHAM & MATTHEWS, N. E. cor. Sixth and Commerce streets, Philadelphia, Pa.; S. H. & E. Y. MOORE, 153 and 165 Lake St., Chicago; GEO. N. GOSLING, 320 Sansome St., San Francisco, Cal. Send for Price List.

ROBERT B. IVES, Sole Manufacturer, 187 St. John St., New Haven, Conn.



C. W. Dunlap & Co.,

43 CHAMBERS ST., NEW YORK,

MANUFACTURERS OF ALL KINDS OF

GARDEN TOOLS

Catalogues furnished on application.



WM. R. HARTIGAN, Burlington, Ct.,

Manufacturer of all kinds of

Tool Handles & Seat Sticks for Carriages, &c.

Also all kinds of ENAMELED GOODS MADE OF WOOD, such as DROP KNOBS, FURNITURE KNOBS, ORGAN STOPS, BRUSH HANDLES, &c., &c.

Also sole manufacturer of the

PATENT ANTI-NEUROUS TRIANGULAR PENHOLDER.

Send for Catalogue and Price List before purchasing.

Manufacture at

BURLINGTON, Conn., U. S. A.

F. R. EMMONS, Agent,

132 Duane St., New York.

Important to Railway Companies, Cities and Mine Owners.

**BLAKE'S
CHALLENGE ROCK BREAKER**

OR
Sectional Cushioned Crusher,

Patented Nov. 18, 1879.

Will be found the most economical and reliable crusher ever offered to the public for crushing

RAILWAY BALLAST, ROAD METAL,

STONE FOR CONCRETE, QUARTZ,

FLINT, EMERY, CORUNDUM,

FELDSPAR, BARYTA,

MANGANESE, PLASTER,

SOAPSTONE, &c., &c.

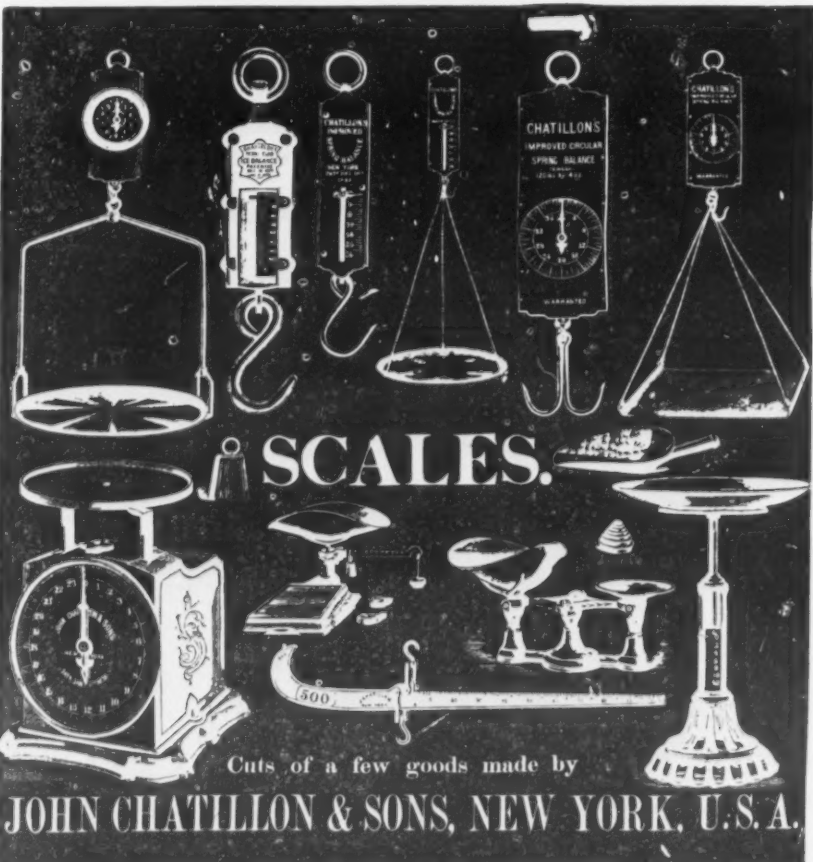
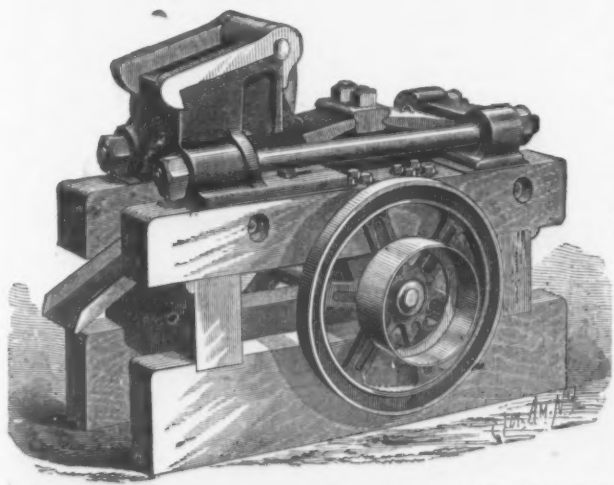
This machine dispenses with cast iron frame and pitman of our old forms. All strains are on wrought iron or steel.

Over 50 Medals, including Paris Gold and Silver Medals.

ADDRESS

BLAKE CRUSHER CO., Sole Makers,

New Haven, Conn.



SCALES.

Cuts of a few goods made by

JOHN CHATILLON & SONS, NEW YORK, U.S.A.

Lake Superior Iron.—The Marquette Mining Journal publishes statistics of Lake Superior iron and ore production, which show that in 1879 there was an increased production as compared with 1878 of 289,089 gross tons, and an increase of 22,179 tons in the shipments of pig metal. The value of these products is given only approximately, on board vessels at port of shipment, care being taken to understate rather than to overvalue them. The figures are interesting in that they show the gradual increase of product during a period of 24 years, and of nearly one million of tons as compared with only ten years ago. The output in 1879 was 246,803 tons greater than in 1873, the largest previous year, notwithstanding the fact that two of the largest mines show greatly diminished figures as compared with those of 1873, the reason for which has heretofore been fully explained. Of the output for 1879, 1,145,093 tons came from the mines of Marquette county, and 269, tons from the Menominee range—the increase from the first being 113,245, and from the latter 170,844 gross tons. It is yet too early to predict with any degree of accuracy the probable output the present year. It is safe to say, however, that nearly all the mines are in a position to enlarge upon last year's figures; whether they will do so depends altogether upon the demand, to which there at present appears to be no end within the utmost possible limit of production. Should this demand take on a positive form in the shape of contracts for the season's delivery, a product of two million tons in 1880 is not to be considered among the impossibilities.

Special Notices.

AT A MEETING of the HARDWARE TRADE of Boston and vicinity, held at the United States Hotel, in Boston, Jan. 21, 1889, it was unanimously voted:

"That the Chairman and Secretary of the meeting be requested to draw up a strong letter addressed to the manufacturers of Boston Hardware, asking them to take immediate steps to relieve the Hardware Trade of Boston and vicinity from the annoyance and trouble in the matter of the 'Tucker Bronze' suits."

In accordance with the above, the Chairman and Secretary desire to say: It seemed to be the feeling of the Trade at the above meeting, very strongly expressed, that the Tucker patent has been sufficiently litigated, and the manufacturers of bronze goods should take immediate measures to arrange with Mr. Tucker and release the Trade from any further annoyance, otherwise the result may be serious.

The Chairman and Secretary have arranged with Mr. Tucker and his counsel that a few days' delay be granted before further suits are brought against the Trade in Boston and vicinity, which we are positively assured will be done, if in the meantime no arrangement is made by the manufacturers. If this is not done the Trade proposes to take proper steps to protect themselves, and to that end will purchase goods, as far as possible, of those manufacturers who have a license to manufacture and sell bronze goods.

BENJ. CALLENDER, Chairman.
C. C. ADAMS, Secretary.
Boston, Jan. 23, 1889.

FOR SALE.

The large and extensive Iron Works situate on Center Island, in the Hudson River and opposite the city of Troy, comprising a Foundry, Machine Shop, Boiler Shop, Blacksmith Shop, Flow Shop, Docks, Cranes, &c., &c. The works are fully supplied with Engines, Lathes, Planers, Forges, Bolt Cutters, Riveting Machines, &c., &c., and a large amount of other valuable machinery necessary for carrying on the business of the various departments.

These works are admirably located for all kinds of manufacturing purposes, and for transportation of materials and products by land and water, and have been in operation for over thirty years, under the management of Messrs. Starbuck Brothers, and are well and favorably known throughout the country. In consequence of the death of several of the parties interested in said property and business, the works are now offered for sale, including several acres of land, at a low price and on the most advantageous terms for purchasers.

For further particulars apply to
LEWIS E. GURLEY, Trustees.
N. DAVENPORT,
17 First St., Troy, N. Y., Jan. 31, 1889.

ROLLING MILL FOR SALE.

This mill is situated at Canal Dover, Ohio, upon the Ohio Canal, the Cleveland and Pittsburgh, the Marietta, Pittsburgh and Cleveland and the Cleveland, Tuscarawas Valley and Wheeling Railroads. Has 16 puddling and 1 heating furnace, 16-inch muck train, 12-inch bar train, first class engine built by Cuyahoga Steam Furnace Co., 14 acres land, block of 6 brick dwellings, warehouse, office, blacksmith shop, &c., complete. Can be put in operation at reasonable expense. Good coal delivered at mill \$1.25 per ton. Price, \$12,000, and terms of payment liberal. Apply to S. W. CROXTON, Canal Dover, Ohio, or RHODES & CO., Cleveland, Ohio.

Machine Works for Sale.

The property known as the "Portland Machine Works," situated in Portland, Me., No. 315 Commercial St., in close proximity to tide water and railroads, consisting of about 42 feet of land, with side on Commercial St., north on York St., with two-story brick Machine Shop, 30 x 35; Blacksmith Shop, 37 x 40; Boiler Shop, 24 x 40; Foundry, 54 x 84; Milling Room, 24 x 30; Sand Shed, 20 x 30, all brick. Stable and buildings for patterns and mounds. Patterns for the following: Engines, Mill Work, Gearing, Pulleys, Valves, Building patterns, together with all tools, such as Lathes, Planers, Drills, Slotters, Steam Hammers, Cranes, &c., usually found in first-class establishments. Facilities for shipping either by rail or water are excellent. The above works were established in 1850 or thereabouts, and have had a large run of business. Its present capacity is about \$200,000 per year. The above property will be sold very low if applied for soon.

EBEN COREY, Portland, Trustees.
RICHARD FRENCH, Portland.
E. P. CUTLER, Boston.

Protection in Canada.

The new tariff stops importation. Branches of existing U. S. manufacturing companies are accordingly being established in Canada.

A Complete Manufactory, with substantial buildings, water power, in good center for labor and railway distribution; obtained by owners by foreclosure; offered for sale at a bargain; terms easy. Full information on application to
DONALD C. KIDOUT,
Toronto, Ontario.

FOR SALE.

Water front property of 50 acres or more, with frontage of 100 feet for docks, suitable for manufacturing purposes. The tract is crossed by the Lehigh Valley, Central of New Jersey and Pennsylvania Railroads, and fronts on deep water on the line of the Delaware and Raritan Canal towing route at Perth Amboy, N. J. It is within a short distance of the terminus of the Lehigh Valley Railroad on the sound at Perth Amboy. Address
WILLIAM T. MEREDITH,
37 William St., New York.

WIRE MANUFACTURER.—A gentleman who has had several years' experience in the best mill in the country as Manager. Small mill preferred. Address "WIRE," Office of The Iron Age, 83 Reade St., N. Y.

Special Notices.

SECOND-HAND and NEW TOOLS FOR SALE LOW.

February List No. 1.

Miscellaneous Second-Hand Tools.

All in Good Order, and will be sold very low

Two Engine Lathes, 30 in. swing x 7 1/2 ft. bed.
Two Engine Lathes, 24 in. swing x 8 ft. bed.
One Engine Lathe, 18 in. swing x 12 ft. bed.
One Engine Lathe, 18 in. swing x 10 ft. bed.
One Engine Lathe, 18 in. swing x 14 ft. bed.
One Engine Lathe, 18 in. swing x 8 ft. bed.
One Engine Lathe, 18 in. swing x 6 ft. bed.
Seven Engine Lathes, 18 in. swing x 7 1/2 ft. bed.
(Chain-feed Lathes.)
One Horizontal Boring Lathe.
Six Turning Lathes, 14 in. swing x 4 1/2 ft. bed.
Two Wood-Turning Lathes.
One Cement Double-Pulley Lathe.
One Planer, 24 in. x 5 ft.
One Planer, 30 in. x 7 ft. chuck, &c.
One Planer, 37 in. x 37 in. x 10 ft.
One Planer, 75 in. x 66 in. x 24 ft.
Two Planers, 18 in. x 5 ft.
One Planer, 24 in. x 6 ft.
One 3-in. Frail Drill.
One Traverse Drill.
One Four-Spindle Drill.
One Shaping Machine, 12 in. stroke.
Three Bolt Cutters, various sizes.
One No. 2 Bolt Cutter.
One Gear Cutter.
One new "Hardaway" Bolt Heading Machine, to head up to 7/8-in. bolts.
One new "Hardaway" Bolt Heading Machine, to head up to 1/2-in. bolts.
A lot of Saw Tables and Wood Working Machinery.

NEW TOOLS, Very Low.

One Shaping Machine, 14 in. stroke, Wood & Light.
Five No. 2 Bolt Cutters, Wood & Light.
One No. 1 Bolt Cutter, with center, Wood & Light.
Three No. 2 Bolt Cutters, with center, Wood & Light.
One Planer, 30 in. x 8 ft. New Haven.
One Upright Drill, 36 in. New Haven.

Please specify which of the above tools you want and we will forward all particulars.

A Woodruff & Beach Beam Engine,

Low pressure, 42-inch cylinder, 84 inch stroke, with fly-wheel pulley 30 feet diameter, 36 inch face, and

Four Tubular Boilers,
60 inches in diameter, 30 feet long, and all connections practically as good as new.

For sale by
The Geo. Place Machinery Agency,
121 Chambers and 103 Reade St.,
NEW YORK.

FOR Sale or Lease. FOUNDRY, NEW YORK CITY.

The plot of ground (Excellor Works) measures 275 ft. frontage by 100 feet deep. It has a splendid Foundry, 60 x 105 feet, with cupolas, cranes, &c. If leased, additional buildings to any extent will be erected to accommodate any kind of manufacturing business. Apply to WM. J. FRYER, Jr.,
Etna Iron Works, 104 Goreck Street.

ELIZABETHPORT ROLLING MILL, Elizabethport, N. J.,

Common and Refined
BAR IRON,
Fish Plates, Spikes, &c.

Address,
DANIEL W. RICHARDS & CO.,

Importers of and Dealers in Scrap Iron and Metals,
88 to 96 Mangin St., New York.

For Sale,

A ROLLING MILL, located convenient to Pittsburgh, with facilities for river and railroad transportation. The property consists of 38 acres of land, with the necessary buildings, dwellings for workmen, two heating furnaces, eight puddling furnaces, muck train, 16-inch train, 8-inch train, and all the necessary machinery; all in good order, the mill being now in operation. There is a coal shaft on the property with the privilege of 18 acres of coal, and coal is run direct from mouth of shaft to the furnace.

For further information address
Lock Box 100, Pittsburgh, Pa.

DESIGNS FURNISHED FOR Superior Manufacturers' Tools

And Special Appliances.

Improvements made, ideas worked out. Drawings, models, patterns and machines made to order in the best manner.

RICHARDS & DOLE, Springfield, Mass.

Wanted.

To exchange cash and some real estate for a stock of hardware.

ROBERT LUCAS,
Fremont, Ohio.

FOR SALE.

One 10-inch train complete, made by A. Garrison & Co., Pittsburgh, consisting of Bounding, Strand and Guide Rolls, with housings, pulleys, spindles, boxes and crabs.
The train is new and has never been used.
Apply to
CHOUTEAU, HARRISON & VALLÉ IRON CO.,
No. 942 N. Second St., St. Louis.

FOR SALE.—Valuable Charcoal Furnace Property, Hampshire county, West Virginia, near Baltimore and Ohio R. R.; about 800 acres well wooded, with large deposits of superior quality ores for car wheels and Bessemer iron. Improvements, one furnace and buildings, engine, &c., complete. Ready for immediate operation. Five months' charcoal on hand.
Apply to
TITUS E. EMERY, 238 Walnut St., Phila., Pa.

WANTED.—A position by a man of eight years' experience in an architectural foundry in a Western city. Understands architectural drawings and construction, and is familiar with estimating. He is also a bookkeeper. Best references. Address
BOX 292,
Montgomery, Ala.

Special Notices.

MENGIS & CO., BANKERS

AND

Railway Commission Merchants.

Dealers in all kinds of

Scrap, Wrought and Pig Iron,
Old Rails and Car Wheels.

NEW STEEL AND IRON RAILS A SPECIALTY.

We have established the above house for the purpose of doing a general Railway Commission business. We negotiate the sale of Railroads (or the controlling interests), and effect consolidations and reorganizations.

We also import direct from different European ports all grades of Iron, Pig, Bessemer Steel, Old Rails, &c.

We sell Locomotives, Passenger, Flat and Box Cars at manufacturers' prices.

Any business in our line we respectfully solicit a share of, always endeavoring to promote the interests of our customers. All orders, either by telegraph or mail, promptly attended to.

Mengis & Co., 43 Pine St., NEW YORK.

Post Office Box 154.
Cable address, "MENGIS, New York."

FOR SALE, FIRST-CLASS RETAIL HARDWARE STORE

On one of the principal streets. About \$2000.
New stock. Address
E. F.,
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

FOR SALE.

Stock of General Hardware, Store Building and good Dwelling connected. Situated in a small town, and one of the best grain markets in Ohio. Good opening for an energetic man. For particulars address
Lock Box 186, Canton, Ohio.

Wanted.

A second-hand Burdett Bolt Header, size A. Parties having one for sale will please address the undersigned, stating condition and price of same.
WM. H. HASKELL & CO.
January, 1889.
Pawtucket, R. I.

For Sale.

The Stock and Fixtures of the Hardware business located at 49 Water and Commerce Sts., Norwich, Conn. Stock \$18,000 to \$20,000.
FULLER & PARISH.
Norwich, Jan. 26, 1889.

ENGLAND.

Negotiator of contracts for Iron and Steel Rails, Hematite and Cleveland Pig. Reference kindly permitted to John B. Anthony, Esq., President Providence Tool Co., Providence, R. I. Correspondence solicited by
H. GIELGUD,
65 Gracechurch St., London.

Wanted.

A Superintendent for a Bolt and Nut Factory; man thoroughly competent to handle a large institution, and practical in all the branches of the departments. Must be able to give unquestionable references. Address
LEIR,
Office of The Iron Age, 77 4th ave., Pittsburgh, Pa.

Nail Works, Foundry & Rolling Mills

AT EAST WAREHAM, MASS.,
FOR SALE.

Immediate possession. All in good order. Splendid water power. Address
L. B. TISDALE, East Wareham, Mass.
Or K. CORNWALLIS, Wall St. New York.

Sanderson Bros. Steel Co.

A limited number of shares for sale by
EDWARD FRITH & SON,
211 Pearl Street, New York

WANTED.—A situation as resident or traveling salesman or bookkeeper with a reliable house East or West, by a gentleman of ten years' experience in the Hardware and Shoe business; understands bookkeeping by double entry. Good references. Address
P. O. BOX 117,
New Haven, Conn.

Special Notices.

A. J. STEINMAN, CHAIRMAN. W. R. HINDLETON, Supt.
W. O. MENDENHALL, Sec'y & Treas.

OFFICE OF

PENN IRON COMPANY, Limited,
MANUFACTURERS OF
Merchant Bar Iron, Hammered and Rolled Axes, Car Forgings, Bridge Work, Fish Joints, Bolts, R. R. Spikes, Bolt Ends, &c., &c.,
LANCASTER, PA.

WANTED.

A good second-hand Engine, 16 or 17 inch diameter cylinder, short stroke, to run about 200 revolutions per minute; suitable to drive a train of small rolls.

FOR SALE.

One large Planer, 25 ft. long, 5 ft. square, built very heavy, in first class condition. Also, one Boring Mill, one large Slotter, one Shaper, three Drill Presses, one small Lathe, lot of Vices, one Steam Hammer for making blooms, lot of Wood-Working Machinery for making patterns, Shafting and Pulleys; also, large lot of Flasks and Foundry Findings, for doing light and heavy work, and one large Cupola and one large Foundry Crane, all in good condition and for sale cheap. Address
PENN IRON CO., LIMITED,
Lancaster, Penn.

PRICE BOOKS.

Full Leather, \$7.50. Half Leather, \$6.50.
Pocket Edition, Full Leather, \$3.50.
Bolt List, \$1.50.
Screw List, 50 cents.
Leigh's Discount Book, 50 cents.
Hueil Lamberson, 97 Chambers St., N. Y.
For sale at publisher's prices by Wm. Blair & Co., (Chicago); A. F. Shapleigh & Co., St. Louis; C. B. James, Detroit.

ROLLING MILL FOR SALE.

One of the best located Iron properties in the State of Pennsylvania. Mill is nearly new, with capacity of 70 tons rails per day.

Address P. O. BOX 2116,
Philadelphia.

LEIGH'S Discount Book.

Hardware Buyers will find this book particularly valuable. Shows at a glance the net of any discount or combination. Also contains computing tables for quickly and accurately reckoning discounts. Indexed so any table can be referred to instantly without turning a leaf or wasting a moment.
Bound in Leather. Price, \$1.00
Cloth. Price, .50

Address
EDWARD B. LEIGH,
St. Louis Elevator, St. Louis, Mo.

IVISON, BLAKEMAN, TAYLOR & CO., New York

FOR SALE.

A medium sized Alden Ore Crusher. Used only a short time, and in good order. Address
M. B. JOHNSON,
67 Fourth Ave., Pittsburgh.

FOR SALE.

The entire Canadian right of Kenyon's Adjustable Chain Pump Bucket, a superior and substantial article. Can be accurately adjusted to fit the tube, and enlarged to take up the wear, so that the pumps can be kept in good working order. United States right for sale or lease on royalty. Address,
THOMAS KENYON, Patentee,
Box 104, Hamilton, Ohio, U. S. A.

FOUNDRY PROPERTY FOR SALE.

Buildings, Engine and other Machinery suitable for manufacturing purposes; 40 miles from New York by water or railroad. Address
W. R. Wadsworth,
Room 9, 155 Broadway, New York.

AGENT WANTED.

One of the largest German Wire Mills desires a respectable and pushing agent, with first rate connections in the Wire and Rope trades.

Address
WIRE AGENT,
Office of The Iron Age, 83 Reade St., New York.

JOHN R. WHITLEY & CO., European Representatives of First- Class American Houses,

WITH
FIRST-CLASS AGENTS

IN THE
Principal Industrial and Agricultural
Cities and Centers of Europe.

TERMS ON APPLICATION.

LONDON, PARIS,
7 Poultry, E. C. 8 Place Vendôme.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,
Issue Licenses to use the Process for the
Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th, 1877.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas.

Address
HARDWARE,
Box 366, Salina, Kansas.

AN EXPERIENCED HARDWARE

man, fifteen years in one large house in this city. Was bookkeeper, cashier, stock buyer, salesman and one of the managers. Open for any position at a moderate and reasonable salary. First-class city references. Address
HARDWARE, Station L, New York City.

Special Notices.

To Manufacturers.

We are prepared to furnish

Recipes and Information

ON ALL

INDUSTRIAL PROCESSES.

Address

**PARK BENJAMIN'S SCIENTIFIC
EXPERT OFFICE,**
37 Park Row, - NEW YORK CITY.

JOHN E. SWAN & BROTHERS, IRON MERCHANTS,

Glasgow and Middlesbrough,
Exporters of all brands of

Scotch & English Pig Iron.

c. f. i. to America and f. o. b. British ports.

Old Iron Rails, Puddled Bars AND MANUFACTURED IRON.

BLOWING ENGINE

FOR SALE.

Built by I. P. Morris, Towne & Co., 36-inch Steam Cylinder, 84-inch Blowing Cylinder, 6-foot stroke.

Also, an Air Hoist, with 68 feet lift, 36-inch Cylinder.

They have been well taken care of, are in good working order and ready for immediate use. Apply to

POTTSTOWN IRON CO.,
WILLIAM H. MORRIS, Treas.,
Pottstown, Pa.

TO MANUFACTURERS AND CAPITALISTS.

FLOWER PINS.

PATENT FOR SALE.
Address
J. H. PLUMMER,
1276 Pacific Street, Brooklyn, N. Y.

TRUSTEES' SALE OF VALUABLE IRON PROPERTY.

FOUR THOUSAND ACRES OF VALUABLE LAND—POTENTIAL to a mortgage executed by James Woods, H. C. Yeaman and James Woods, Jr., registered in the Register's Office of Stewart Co., Tennessee, in book 24, pages 410 to 420, inclusive, the undersigned will sell on the premises, for cash, on the 31st day of March, 1889, that very valuable iron property located in Stewart County, Tennessee, known as Cumberland Iron Works. Parties wishing fuller information will please address the undersigned, care of Third National Bank, Nashville, Tenn.

TEMPLE O. HARRIS, Trustees.
V. L. KIRKMAN.

ASTONISHING POWER IN PUNCHING & SHEARING PRESSES.

See our illustrated advertisement on next to last page of this paper.

PEERLESS PUNCH AND SHEAR CO.,
52 Dey Street, New York City.

FOR SALE OR RENT.

The Rolling Mill Property at Topeka, Kansas, known as the Topeka Rolling Mill, for re-rolling old rails. Capacity about fifty tons per day. Machinery of most approved kind and in good order, having been run but about six months. Parties desiring to lease or buy the property can do either on favorable terms. For particulars address,
T. B. SWEET,
Topeka, Kansas, or
ROYAL M. BASSETT,
Birmingham, Conn.

For Sale.

23 in. x 48 in. CORLISS ENGINE.
Can be seen running. Will be delivered latter part of this month. Also 18 in. x 40 in. Hewes & Phillips. Can be delivered at once.
E. P. BULLARD,
14 Dey St., New York.

Wanted--A Blast Furnace Founder.

The Duluth Iron Company wish to engage a first-class Charcoal Furnace Founder, 30 years of age, who has had experience in running a charcoal furnace, and can give satisfactory reference, steady employment with a fair salary will be given. Address, giving references, and salary wanted,
S. BROWNELL, Supt.,
Duluth, Minn.

Pressure Blower.

A No. 6 Root Blower, of extra strength, steel shafts, used less than four months, for sale at \$500, f. o. b.
FRANK KING,
Van Buren Furnace, Shenandoah Co., Va.

WANTED—A situation, by a young man in a

Hardware Manufacturing Co. has had six years' experience in the Hardware business; has followed the positions of shipping clerk, salesman and traveling salesman; is versed in Saddlery and Carriage Hardware as well as general Hardware; is connected with a jobbing hardware house at present. Best references given. Address
HARDWARE MFG. CO.,
Office of The Iron Age, 83 Reade St., New York.

FOR SALE,

Job Lots and Bankrupt Stocks Hardware.
Great bargains offered to the trade.

Douglas Patent Auger Handles... net
all large, \$1.38 per
set.
Saw's Patent Augers... net
Improved Augers... net
Boring Machines... net
Spoke Trimmers... net
Tap Bore... net
with Ring... net

The Cowles Hardware Company, Unionville, Conn., have issued the following discount sheet:

	Dis. per cent.
Axle, Carpenters' Forged	40
" Machinists	40
" Marking	35
" Bolt	30
" Ring Starts	25
" Butter Spuds	25
" Boot Jacks, Automatic	20
" Tally Ho	20
Bill Hooks	per doz, net, \$12.00
Bull Rungs	60
Bow Pins	25
Butts, Double Spring	25
" Single	25
" Blank	25
Border Knives	40
Box Openers	35
" Hooks	35
" Scrapers	35
Cleavers' Cast Steel	25
Cake Turners	40
Corn Hooks	30
Cover Lifters	35
Cold Chisels	35
Cattle Leaders	25
Carrage Jacks	per doz, net, \$3.00
Carpet Stretchers, Burdett's	25
" Common	25
Door Spring, Hercules	40
" Air Cushion	35
Door Check	35
Egg Beaters	10
Fish Turner	40
Ferrules, Brass	40
Faucets, Rosewood	25
Handles	25
Hammers, Steel	25
Hinges, Gate, Double Spring	25
Hammers, Iron Tack	net \$1.00
Hoes, Garden	25
Ice Axes, Iron Head	35
" Maple Handle	40
Ice Tongues	25
Lemon Squeezers	35
Mouse Traps, Pat. Auto, per doz. holes	net 20¢
Mallets	10¢
Mincers, Cast Steel	40
" Hammered	40
Nails, Seta, Black	25
Punches, Solid Center	25
" Round	25
Spoons, Tin, Table and Tea	15
Screw Drivers, No. 1	40
" No. 2	35
" No. 3	30
" No. 4	30
" Sewing Machine	30
" For Lock Spindles	35
" Bit Brace	35
" Implements, price accord.	
Trowels, Garden	30
Tack Claws	30
Washers, Iron, 8 cents off from list price	30
Vegetable Slicers	25

The Girard Wrench Mfg. Co., Ltd., Girard, Pa., advanced their prices on the 2d inst., and now quote their "Standard" Wrenches discount 40 per cent., and "Agricultural" Wrenches, 50 per cent. from list.

We announced last week an advance in the price of Coes' Wrenches, since which the following circular has been issued, containing, in addition to the advance which we announced, a clause under the head of "special notice," to which we invite attention.

TO THE TRADE.

New York, Feb. 2, 1880.

We are instructed to advance Coes' "Genuine" of either make, to 33 1/2 per cent. discount from list. The quotation is subject to change without notice, and is quoted without guarantee.

"Mechanics' " Wrenches, made by L. Coes & Co., and similar quality made by A. G. Coes & Co., will continue to rate at 10 per cent. less than the "Genuine." The foregoing changes to take effect from this date, and are quoted subject to change without notice. All previous quotations are hereby withdrawn and annulled.

We are also directed to call the attention of the larger buyers to the following:

Special Notice.

We will not book nor agree to accept orders in excess of 50 dozen until our present supply of orders is nearer completion. This provision is made in self-defense, and is prompted by the continued uncertainty as to price and supply of raw material.

DURRIE & McCARTY,
Agents for L. Coes & Co.
GRAHAM & HAINES,
Agents for A. G. Coes & Co.

The following circular reached us too late to appear in our issue of 29th ultimo:

PITTSBURGH, Pa., Jan. 24, 1880.

DEAR SIR: We desire to advise you that our present prices on Juniata Horse and Mule Shoes F. O. B. cars or boat here are as follows:

	Per keg, net.
100-keg lots and upward, government pattern	\$6.00
Roadster	6.25
Mule Shoes	7.00

Terms, 30 days.

We can only fill orders now in a limited way, and any sent in must be subject to our approval, and only for such quantities as we, in our judgment, care about taking, based on the present cost of production. Orders, when accepted, will be filled in turn.

We do not issue this circular with the desire of soliciting orders, but for the purpose of letting you know that you might as well secure a reasonable profit on any stock that you may have on hand.

Very truly yours,

SHOENBERGER & Co.

We have received the following circulars:

New York, February 2, 1880.

We have this day changed the discount on Wrought Brass Butts to 30 per cent. instead of 45 per cent. as heretofore.

Yours, P. & F. CORBIN.

FRANKFORD, PHILADELPHIA, February 1, 1880.

To the Trade: We desire to notify you that our discount to the trade is this day advanced to 15 per cent., subject to change without notice.

Respectfully yours, YERKES & PLUMB.

Durrie & McCarty agents, 97 Chambers and 81 Reade streets, New York.

The style of the firm of Clark & Co., manufacturers of Builders' Hardware, Buf-

falo, N. Y., has recently been changed to The Clark Manufacturing Company.

We invite attention to the advertisement of Arnold & Rowe, Lansingburgh, N. Y., Scale manufacturers, on page 32. They are represented by W. K. Ross, 95 Chambers street.

The Stamped Ware Manufacturers' Association of the United States, at a recent meeting, adopted the following revised discounts, to apply to their list of January, 1880:

Common Stamped Ware... Dis. per cent.
Deep Stamped Ware... 25

Rumsey & Co., Seneca Falls, N. Y., have issued an illustrated catalogue of 224 pages, in which they present a large assortment of Pumps, both for hand and power, Garden Pumps, Fire Extinguishers, Garden and Fire Engines, Hydraulic Rams, Chain Pumps and Fixtures, Plumbers' Ironware, Well Wheels, Jack Screws, Thimble Skins and Pipe Boxes, Steel Amalgam Bells, Corn Shellers and kindred goods.

The manufacturers of Iron Wire have again advanced prices. The revised discounts will be found under the heading of New York Wholesale Prices, on another page.

Bissell & Welles, 83 Chambers and 65 Reade streets, announce, in an advertisement which appears among "Special Notices," that they will sell at auction, on Wednesday, February 18, a large line of Shelf Hardware and about 350 lots of French Tinned and Enamelled Ware, direct from the factory. On Thursday, February 19, they will sell an assortment of Edge Tools, Files, &c., and at 12 o'clock on that day, by order of the American Screw Company, 126 cases of "Continental" Gimlet-pointed Flat Head Wood Screws, the assortment of which are shown in the advertisement referred to. They will also sell a large quantity of Tire Bolts, Wrought Butts, Hay and Manure Forks, and on Friday, February 20, Table Cutlery, &c. (seconds), by order of the Table Cutlery Manufacturers' Association. Further particulars will be found in their advertisement, to which the attention of the trade is invited.

BRITISH IRON MARKET.

[Special Report by Cable to The Iron Age.]

London, Wednesday, Feb. 4, 1880.

Scotch Pig.—The demand has fallen off, prices are declining and very little has been done during the week. Since the last cablegram the quotation of Gartsherrie has declined 5/; Coltness, 5/; Glengarnock, 6/6; Eglinton, 7/. Following are the quotations of to-day:

Gartsherrie	76/
Coltness	76/
Glengarnock	76/
Eglinton	76/

Manufactured Iron.—Steady, and prices unchanged. Best Staffordshire Bars are quoted as last week.

Steel Rails.—Are quiet and transactions small. Prices are firm. We quote £10 @ £11.

Iron Rails.—Are in moderate request and but little business is done in them. Welsh are quoted £9 @ £10.

Old Rails.—The offerings are moderate and prices are weaker. Sales small. We quote Old T's, £6. 17/6.

Wrought Scrap.—A fair business is doing in Wrought Scrap and prices are firm. We quote £6.

IRON.

American Pig.—The tone of the Iron market is not as buoyant as we have noticed it of late, although, as regards the domestic article, there is nothing in the present condition of affairs that could be construed as a sign of weakness, so far as prices are concerned. The amount of business reported during the week is light, and we do not hear of much inquiry. On the other hand, manufacturers are so well supplied with orders that there is no pressure to sell. We quote the market firm at the following figures: Foundry No. 1, \$40 @ \$41; Foundry No. 2, \$38 @ \$39; Gray Forge, \$37 @ \$38.

Scotch Pig.—Sales are reported of 200 tons Coltness, to arrive, at our quotations; 100 tons Eglinton at \$33; 100 tons Glengarnock at \$35, and 125 tons Middlesboro Iron at \$32.50. Our cable dispatch announces a declining market on the other side, and in consequence the tone here is weaker than at our last writing, and some brands are offered at about \$1 per ton under the quotations of last week. We quote Eglinton, \$32 @ \$33; Coltness, \$35; Glengarnock, \$34 @ \$35; Gartsherrie, \$33 @ \$34.

Rails.—Sales of English Iron Rails, to arrive, aggregating over 13,000 tons, on private terms, are reported. No transactions in domestic Rails, either Steel or Iron, have come to our notice during the week. We quote, nominally, Iron, \$65 @ \$68; Steel, \$80 @ \$85.

Old Rails.—The demand for Old Rails is not particularly active at the moment, and importations during the week have been light. A sale is reported of 1000 tons T's, to arrive, at \$43. We quote \$43 @ \$45 for T's and D. H. respectively.

Scrap.—There has been considerable business in Wrought Scrap this week, sales being reported of 1200 tons, in lots, at from \$42 @ \$45. We also know of a sale of 1000 tons, to go West, at \$43, and a rumor is current of a select lot being sold at \$46, but we are

unable to trace it. We continue our quotation—\$43 @ \$45 for No. 1 Wrought, from yard. The arrivals during the week were trifling.

Manufactured Iron.—The demand for Bar and Sheet from store is active, and the advanced price list which appeared in our last issue is, we are informed, strictly adhered to by the city trade. Foreign Iron continues to arrive freely, the number of Bars received at this port for the week ending February 3 being 38,064.

Our advices from Pittsburgh this week are of more than usual importance. The meeting of the Western Iron Association, which was held Friday of last week, not only advanced the card to 4¢, but adopted some important changes of classification in Bands, Wagon Box, Hoop, Tank, Plate and Sheet Irons. These will be found in another column. The changes in Hoop Iron are to conform the card to that of the American Hoop Iron Association, which gives a uniform card all over the country. The changes, in short, restores the card to about what it was in April, 1876. The advance in the price seemed a necessity, though it was a source of regret to many of the members that such a necessity existed. Many conservative mills believed that the era of prosperity would have a better chance of being permanent if the rise in prices had not been quite so rapid.

METALS.

Copper.—The market for Copper has been quiet this week, after the excitement of the last. Sales have been made to the extent of 400,000 pounds Lake Superior at prices from 25¢ down to 24 1/2¢, cash. Rumors are current of yet lower prices, but could not be traced by us. The present quotation is 24 1/2¢, cash, and 25¢ for future delivery; few offerings are made, the bulk of the stock on hand having been sold for future delivery. Baltimore is worth about as much. Messrs. F. W. Heyne & Bro., of this city, have just issued the ensuing circular, detailing last year's Copper movement in this country, which, owing to its importance, we reprint in full:

Stock, January 1st, 1879, estimated... 17,000,000
Product at Lake Superior... 40,000,000
Product at Baltimore, North Carolina,
Vermont Smelting Works... 6,000,000

Total	63,000,000
Consumption, averaging 3 Lbs.	
at 4,000,000 lbs. per month...	42,000,000
Export...	13,500,000
Returned...	9,500,000
	11,000,000
	53,000,000

Stock, Dec. 31st, 1879... 10,000,000
There being no control in regard to stock and consumption, it is difficult to form an estimate with any degree of certainty. From January 1 to end of May, 6,000,000 lbs. were exported from the old stock, at least 9,000,000 lbs. went into consumption, and about 2,000,000 lbs. were left in the hands of speculators. The stock on January 1, 1879, could therefore not have been less than 17,000,000 lbs. The consumption has been very large during the last four months of 1879, and is estimated to have been about 5,000,000 lbs. per month; an average of 3,500,000 lbs. per month is therefore not too high.

Taking the consumption for the next five months, January to May inclusive, at 4,000,000 lbs. per month, it would Lbs. amount to... 20,000,000
We have against that: Lbs.
Stock, January 1, 1880... 10,000,000
Receipts, per rail, from Lake Superior... 4,500,000
Superior... 4,500,000
Receipts from Baltimore, North Carolina, Vermont, &c., smelting works... 6,000,000

To be provided for by importation from England... 3,000,000

English prices are reported by cable £81 for Best Selected and £74 for Chili Bars. The stock of Wallaroo Copper in London of 2200 tons has been sold on private terms. According to late cable dispatches from the West Coast, nobody seems to pronounce the word "peace" yet, and the war goes on without any decisive results. There has been no change in the manufactures of Copper here since our last report. We quote: Braziers' Copper, 34¢; Bolts, 34¢; Circles, 37¢, and Sheathing Copper, 32¢.

Tin.—Our market has ruled rather quiet since our last report, with somewhat lower prices, caused partly by a quiet London market and partly by a momentary quietude in all metals. London cables £96 for Straits and all metals. \$31 1/2 pious. Shipments from the Straits to the United States during the latter half of last month have been 950 tons, of which 250 tons are, however, by rail, and only due some four months hence. The Banca sale of the 27th of last month, in Holland, brought the parity of £101 at London, or about 59 guilders the 50 kilos, on an average. Amsterdam quotes, per cable, 59 guilders yesterday. There have been no arrivals of Tin whatsoever at New York and Boston since we last reported. We quote to-day, large lots: Straits, 24¢; Australian, 24¢; Billiton, 23 1/2¢; Banca, 26¢; English Refined, 23 1/4¢, and ditto Common, 23 1/4¢. English Common is cabled from London, £105. Tin Plates are quiet in a jobbing way, while the transactions from first hands continue on an extensive scale. The English market is cabled strong, with Cokes, 30/ @ 32/.

We quote, per box, large lines, ordinary brands: Charcoal Bright, \$10 @ \$10.25; ditto Terns, \$9.25; Coke Tin, \$8.75, and ditto Terns, \$8.37 1/2 @ \$8.62 1/2.

Lead.—Early in the week some 200 to 300 tons Common Domestic sold at 6¢; since then only small lots have changed hands at the same figure. Small transactions have also taken place in Refined Lead at 6 1/2¢. Manufacturers' prices are unchanged. We quote: Bar, 6 1/2¢; Pipe, 7 1/2¢; Sheet, 8 1/2¢; Tinned Lead Pipe, 15¢, all less 10 ¢ to the trade. No. 1 Solder, 13¢.

Spelter and Zinc.—A fair amount of inquiry prevails for Common Domestic Spelter at 6 1/2¢, and at 6 3/4¢ for Silesian. Sheet Zinc is steady at 8 1/2¢.

Nickel.—A moderate demand exists at \$1.40 per pound for Prime American. Antimony.—Since we last reported nothing of special interest has occurred. The price of this metal is sustained at 23¢ for the "Cookson," and 20¢ for the "Hallett" brand.

OLD METALS, PAPER STOCK, &c.

No appreciable change in prices has occurred in this market since our last report. Old Metals continue in good demand, and the inquiry for Rag and Paper Stock is even better than it was last week.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy	per lb. \$0.10 @ .20
Copper Bottoms	.15¢ @ .16¢
Yellow Metal	.10 @ .11
Brass, heavy	.12 @ .13
Brass, light	.15 @ .16
Compression, heavy	.18 @ .19
Lead, heavy	.04¢ @ .04 1/2
Lead, No. 1	.04 @ .04 1/2
Pewter, No. 1	.12 @ .13
Pewter, No. 2	.10 @ .11
Wrought Iron	per ton 32.50 @ 35.00
Light do.	30.00 @ 32.50
Stove Plate	15.00 @ 17.00
Machinery do.	20.00 @ 22.50
Grate Bars	7.50 @ 10.00

The prices current for Rags &c., are as follows:

Canvas, Linen	per lb. 4 1/2¢ @ 6
White Cotton, New	4 1/2¢ @ 5
" No. 2	3 1/2¢ @ 4
White, No. 1	3 1/2¢ @ 4
" No. 2	3 1/2¢ @ 4
Second, No. 1	3 1/2¢ @ 4
Soft, Woolen	16 ¢ @ 17 ¢
Mixed Rags	2 ¢ @ 3 ¢
Gunny bagging	4 ¢ @ 5 ¢
Blue, heavy	3 ¢ @ 4 ¢
Kentucky bagging	2 ¢ @ 3 ¢
Book Stock	3 ¢ @ 4 ¢
Newspapers	2 ¢ @ 3 ¢
Old Paper and Scrap	1 ¢ @ 2 ¢
Kentucky Bale Rope	4 ¢ @ 5 ¢

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Feb. 3, 1880:

Hardware.

Alexandre, F. & Sons,	Pig, tons, 100
Lee, Jas. & Co.	Pig, tons, 100
Baldwin, Bros. & Co.	Pig, tons, 100
Hild, C. & Co.	Pig, tons, 100
Bloomfield, J. C. & Co.	Old rails, per ton, 150
Milliken & Smith,	Rods, bbls, 100
Monjo, L. J. & Co.	Old rails, a quantity
Baker, H. & Co.	Old rails, per ton, 17
Moore, J. F. & Sons,	Hoop iron, bbls, 79
Cutlery, cas, 1	Morton, Bliss & Co.
Cutlery, cas, 6	Old rails, tons, 500
Charles, R. P.	Grinding stones, 3000
Folsom, H. & D.	Angle iron, bars, 14
Arms, cas, 1	Bars, 3700
Gold & Steel Teleg. Co.	Piersen & Co.
Bars, 5000	Bundles, 250
Stroud, W. L.	Hoop iron, bbls, 3000
Swift, H. H. & Co.	Old iron, tons, 150
Williamson, Jas. & Co.	Pig, tons, 200
Order	Bars, 11,851
Bundles, 210	Cart iron, cas, 608
Hoops, bbls, 100	Iron tank plates, 510
Old horseshoes, tons, 13 1/2	Old rails, 1845
Old rails, a quantity	Old rails, per ton, 8711
Old rails, tons, 1253 1/2	Pig, tons, 200
Rails, 250	Scrap, loads, 14
Scrap, tons, 430 1/2	Wire rods, pigs, 2550

Metals.

Alexandre, F. & Sons,	Tin plates, cas, 5
Barnett, Jas.	Zinc, cas, 1
Barnstorf & Co.	Brass, bbls, 2
Copper, pigs, 3	Yel. metal, pigs, 4
Byrne, Jos. & Co.	Tin plates, bxs, 1150
Coddington, T. B. & Co.	Tin plates, bxs, 312
Cort, N. L. & Co.	Tin plates, bxs, 90
Cutter, E. P. & Co.	Yel. metal, cas, 32
Met. gals, cas, 108	Yel. metal, pigs, 108
Dickerson, Van Dusen & Co.	Tin ingots, 126
Hagemeyer & Brunst,	Met. comp, bbls, 38
Heuermann, W.	Zinc dust, cas, 9
Howard Bros. & Read,	Zinc works, cas, 2
Zinc works, cas, 2	Kimney & Lea,
Lead, bbls, 321	Lead, bbls, 321
Mestre, Kemp & Co.	Old copper, bbls, 5
Meyer, Morris,	Lead, bbls, 321
Nevada Bank of San Francisco,	Tin plates, bxs, 1449
Paulsen, Wm.	Spelter, plates, 4967
Phelps, Dodge & Co.	Tin plates, bxs, 337
Tin plates, bxs, 175	Black tag's, bxs, 175
Pratt, C. & Co.	Tin plates, bxs, 320
Tilton, L. G. & Co.	Copper, cas, 6
Order	Copper, bbls, 222
Lead, bars, 8	Lead, pigs, 1833
Spelter, plates, 1268	Tin ingots, 910
Tin plates, bxs, 175	84

Iron.

Abenheimer & Co.	Pig, tons, 100
Bank of N. Y. National	Bundles, 484
Hoops, bbls, 5994	Baring Bros. & Co.
Pig, tons, 380	Ang. iron, bars, 1175
Old rails, per ton, 745	Wire rods, pigs, 1780
Wire rods, pigs, 2445	Barnstorf & Co.
Cast iron, lbs, 10,570	Forg. iron, lbs, 24,455
Carey & Moen,	Rods, bbls, 480
Elliott, Sons & Co.	Ore, tons, 2000
Hopkins, E. T.	Bars, 15,479
Order	Bundles, 549
Blooms, 3429	

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending February 3, 1880:

Dutch West Indies.

Quan.	Val.		Quan.	Val.	
Ptln., gals.	5,440	\$645	Mf. iron, pigs. 2,470	12,303	
Mf. iron, pigs . . .	10	180	Ptln., gals.	450	140
Cartridges, cs . . .	2	136	Glassw.	41	1,114
Glassware, cs . . .	28	285	Hdw.	150	2,760
Percus.cps, cs . . .	6	326	Mach'y, pigs . . .	29	4,663
Tinware, cs	4	107	Nails, hlds. . . .	6	430
Hdw, cs	32	344	Cop. gds, cs . . .	2,750	
Saw, mach, cs . . .	4	140	Scales, pigs . . .	19	233
Ptld. ware, cs . . .	9	321	Nails, kegs. . . .	20	134
Revolvers, cs . . .	3	360	Copper.sheets . .	24	4,903
Shoe nails, cs . . .	10	65	Tin, bxs	6	96
Lead, rolls.	10	72	R. R. mt., pigs. 183	47	

only necessary to say that there is a difference of rather more than a dollar between them.

The soft, free-burning Coals are from \$2.75 to \$2.80 for Broken, Egg and Chestnut, and \$3 for Stove. The harder Coals command proportionate prices, while the manufacturing sizes of Lehigh hold at circular rates. The large companies are not selling Coal at the present time. They show considerable concert of action, possibly because they do not wish to begin a war quite so early in the season.

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, Feb. 3, 1880.

Pig Iron.—The market during the week has been very quiet, and although prices are nominally unchanged, the average sales would doubtless show a decline of at least \$1 per ton. The demand is very light, but more than equal to the offerings from first hands. The offerings of foreign iron and lots held in second hands have been more urgent, however, so that there is an unsettled feeling and a good deal of doubt as to the immediate future of the market. The general feeling still seems to be in favor of higher prices, and the present inactivity is said to be preliminary to a further advance at an early date. Notwithstanding the high figures quoted, as compared with prices during the past five years, there seems to be entire confidence in values, and materially lower prices are scarcely thought of, unless as a stepping stone to something higher. As intimated in our last, this feeling, of itself, tends in a large degree to sustain the market, although experienced men express the opinion that there is a solid foundation on which to base present quotations. The enormous consumption bids fair to continue without abatement during the current year, while the capacity for production has not proved nearly equal to what was predicted some time ago. The difficulty of securing suitable ores in quantity is said to be another formidable obstacle, and for months to come it is said that production cannot exceed consumption. If these views are correct (and they are held by the majority), prices will no doubt be sustained, and probably some advance may be realized in course of a few weeks. There seems to be danger in the large importations of iron, and unless foreign markets follow our own, there may be trouble from these sources. There is already a difference of \$5 @ \$8 per ton between the foreign and domestic article, No. 3 being about \$31 for the former and \$30 for the latter, and the best brands of No. 1 Foundry \$37 against \$43. At the figures quoted for foreign iron, there is said to be a very liberal margin for the importer, while the fact of its increased consumption indicates that, at a price, it will be taken in preference to the American iron. In the meantime consumers are experimenting, but from the increased sales we have reason to believe that it is likely to be a dangerous competitor, if prices of American advance much further. Since writing the above we find that there is to-day more pressure to sell and prices are decidedly easier, American iron being quoted for Philadelphia delivery: No. 1 Foundry, \$41 @ \$43; No. 2 Foundry, \$39 @ \$40; Gray Forge about the same price. North of England, \$32 @ \$35, with offerings, to arrive, at \$2 @ \$3 per ton less money.

Blooms.—There is much difficulty in giving anything like correct quotations, but we hear of Anthracite Blooms being held firmly at \$95; Charcoal do., \$105.

Muck Bars.—Business during the week has been very light, owing to the scarcity of stock and the extreme views of holders. Sales have been made in a small way at \$63 @ \$65, at which figures the market may be considered steady and firm.

Structural Iron.—The demand has been somewhat more active, and sales to a moderate extent have been made at current quotations. The outlook is good, and manufacturers anticipate a demand equal to their full capacity. We have not heard of any transactions of special importance, but the mills are running full on orders received from week to week. Angles are quoted at 4¢; Beams, Channels and Tees at 4.5¢.

Plate and Tank Iron.—There has been a little more inquiry, but the demand is not specially urgent, although the outlook is considered better than it has been for some time. Orders for special sizes are quite numerous, and stocks are probably run down to a low point and will need constant replenishing. Shipbuilders have been steady buyers during the week, not in large lots, but the aggregate has been of some importance, and it is likely that the demand from this source will be continued for some time. Prices are firm as last quoted, viz.: Tank, 4.3¢; C. No. 1, 4.5¢; C. H. No. 1 Shell, 4.7¢; Flange, 7¢; Flange Fire-Box, 7¢; Best Bloom, 7.5¢.

Sheet Iron.—There is no change to note in this department, except a slight advance in prices. Manufacturers find business crowding in on them, and have advanced prices about \$5 per ton. The outlook seems to indicate an unusually heavy demand during the spring months, and it is not unlikely that prices may show a further advance in the course of a few weeks. Meantime the following fairly represents the market at this date:

Common Sheet, No. 26 to 28.....6.5¢
Common Sheet, No. 28 to 30.....6.5¢
Common Sheet, No. 30 to 32.....6.5¢
Best Refined 1/4 advance on the above.
Best Bloom Sheet, No. 26 to 28.....8.5¢
Best Bloom Sheet, No. 28 to 30.....8.5¢
Best Bloom Sheet, No. 30 to 32.....8.5¢
Common Red Plates, 3-16 to 1-8.....4.5¢
Blue Annealed, 3-16 to 1-8.....4.75¢
Best Bloom Galvanized, discount.....List price
Second quality, discount.....10.5¢

Bar Iron.—There is no falling off in the demand, and at 3.8¢ manufacturers can obtain all the business they desire. As a rule 4¢ is the quotation for anything not in stock, but business is checked somewhat by the unwillingness to enter orders for forward delivery. Consumption is still on the increase, especially in connection with Car building, and the utmost capacity of the mills will be required to meet the demand. The low price at which foreign iron is quoted is directing attention to markets abroad, and there may be danger from too

large importations. Still, although the price seems low, there is said to be considerable difficulty in placing orders, manufacturers in England being as unwilling as others are to enter for forward delivery. Then, again, there is difficulty in getting an assortment of sizes, without taking into consideration the question of quality. We have not had many Bars imported into this market, but the steadily advancing price of American iron compels buyers to look in every direction for supplies at prices which will allow some margin for profit. Skelp Iron is still in demand at full prices, and may be quoted 4.3¢ for grooved to 4.75¢ for sheared.

Steel Rails.—There is no change in any respect, prices being fully maintained, and still tending upward. It is difficult to quote sales, but at the Western mills \$90 has been paid, and \$85 to \$90 may be regarded as extreme limits. Buyers are numerous, but sellers are not offering rails, unless in reply to urgent inquiries from regular buyers.

Steel Blooms.—Sales have been made at prices equal to \$58 @ \$60. Several thousand tons have changed hands during the week, but it is uncertain if they will be shipped to the United States.

Iron Rails.—A considerable amount of business has been done during the week, and we hear of sales reaching nearly 20,000 tons, at prices varying from \$68 to \$75, at mill, according to section of Rail. Fifty-sixes have sold at \$68 @ \$70, twenty-fives at \$75, sixteens at \$80, and are all firmly held at outside quotations. The indications point to a heavy demand during the spring months, and manufacturers are firm and unwilling to enter orders, unless at prices which fully meet their views.

Old Rails.—The demand has been much less active during the week and prices are slightly easier, and probably \$1 per ton lower than a week ago. The offerings have been small, however, and the market would, no doubt, quickly react on a very slight improvement in the demand. In the meantime, \$43, spot, and \$44, to arrive, are about the asking prices, but we have not heard of any transactions of a very recent date. In the absence of sales at lower prices, we quote \$43 @ \$44, but, as before stated, orders could probably be placed at somewhat lower figures.

Scrap Iron.—The market remains without change. Good quality of No. 1 Wrought commands \$40 @ \$42; Cast, \$30 @ \$32. Market steady.

Nails.—Business is somewhat quiet, but stocks are greatly reduced, and prices are firmly maintained at \$2.55, less the usual trade discount.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., Feb. 3, 1880.

The weather has become quite cold, and it begins to look as if we might have some winter yet. It is not unusual for navigation to be closed this month, but there is this about it, if the river should happen to freeze over it is not likely to remain so very long. A suspension of navigation just now would be a serious drawback to our manufacturers who are interested in cheap transportation, but, on the other hand, there has been no ice put up as yet in this section of the country, and an ice famine is apprehended. Large shipments of iron and nails were made to St. Louis last week, distance about 1200 miles, at 10¢ per cwt., and glassware at 20¢; this week the rates have been advanced to 15¢ and 25¢. The rates from Wheeling are usually about the same by river as from Pittsburgh, and the shipments of Nails from the former place have been quite large within the past few weeks. The difference in the cost of transportation by rail and river is frequently a fair margin of profit for our manufacturers, and this being the case, it is not strange that they are strongly in favor of river improvement, which, in the South and West, is looming up as one of the most prominent features of the day.

Pig Iron.—There has been a slight lull in the Pig Iron trade the past week, but no signs of weakness have been developed; on the contrary, the feeling obtains among producers that prices will go still higher before the much-talked-of and long-looked-for reaction sets in. One reason of the lull, to which reference has been made, is that consumers generally are well supplied; but few of the mills have less than a two months' supply, and others have from four to six months' stock contracted for, and they are not so anxious to buy now as they have been, although some of the commission men report that they could still place considerable for May or June delivery at current rates if sellers could be found. On the other hand, furnacemen, impressed with the belief that prices are destined to go still higher, are refusing to contract for forward deliveries, except at an advance on the prices now ruling, and this accounts mainly for the lull now prevailing. There has been very little Anthracite iron sold in this market recently; whereas, a month or more ago the great proportion of the business was in the produce of the Anthracite region, and it may be attributed to the fact that prices are relatively higher there than here. The same is true of the Shenango and Mahoning Valley regions west of Pittsburgh. In a word, Pig Iron is higher both East and West than it is in Pittsburgh, and it is argued that unless there is a decline at these points there must, sooner or later, be a further advance here. Bituminous Coal Smelted Irons from Lake Ores may be quoted as follows: No. 1 Foundry, \$44 @ \$45; Gray Forge, Red-short, \$42 @ \$43; do. all ore, Red-short, \$45; do. Neutral, \$41 @ \$43. In regard to Bessemer reports are conflicting. We hear a rumor of a sale at \$51, cash at furnace, while, on the other hand, we heard of an offer to-day to sell at \$45; Coke Iron from native ore, \$43 @ \$45, 4 mos. for Foundry, and \$40 @ \$42 for Mill. Cold-Blast Charcoal quoted at \$62 @ \$65; Charcoal Blooms, no recent sales, held at \$95 @ \$100.

Manufactured Iron.—A special meeting of the Western Iron Association took place in this city last Friday; it was largely attended, nearly all competing points in the West having been represented. The session was a satisfactory one. The main object of the meeting was in regard to prices, which were advanced to a 4¢ basis, owing to the

enhanced cost of raw iron. The advance was not a matter of choice. There was some opposition on the part of Pittsburgh to the advance, on the ground that it was too great, but the Western men, those from Cincinnati in particular, would be satisfied with nothing less, and they carried their point. Cincinnati has a good deal of small trade for which full card rates can be obtained, whereas the business of Pittsburgh is chiefly the very reverse, and, as is well-known, it is difficult ordinarily to obtain full card rates for large orders. The advance from 3 1/2¢ to 4¢ was a radical one, but not extravagant when the enhanced cost of raw iron is taken into consideration.

Nails.—While there has been no change made in the card as yet, it is almost certain that rates will be advanced materially before long—possibly at the next meeting of the Western Nail Association, which takes place here to-morrow week. There have been a number of large orders on the market within the past week, some of them speculative, at full card rates, but manufacturers are refusing to sell, except in a small way to regular customers. Large shipments have been made from Wheeling by river recently, mostly on old contracts, and a good many purchases have been made there within the past year on Pittsburgh account, as the price, until quite recently, was lower than here.

Railway Spikes.—There is no abatement in the demand, nor is there likely to be soon. No change in price—4 1/2¢, 30 days.

Horse and Mule Shoes.—There is an increasing demand, as there usually is this month, when it is customary with some jobbers to stock up, although the policy of anticipating future wants is not near as common as in former years. Shoenberger & Co. quote their Juniata Horse and Mule Shoes in 100-kg lots at \$6 and \$7 per keg, net, 30 days.

Wrought Iron Pipe.—Discount on new list for Gas and Steam Pipe, 35¢; the change, as might be expected in the present condition of the iron market, is an advance. Orders are coming forward freely for the season, and it looks as if the pipe business would be unusually large this year. Boiler Tubes remain unchanged at 5 and 5 1/2¢ discount; Oil-well Casing, 1/4-inch, \$1, net; do., Tubing, 2 inch, 35¢, net.

Rails.—No sales of Steel Rails have been reported here for some time past, and it is difficult to give accurate quotations in consequence; prices continue on the upward move, and it is doubtful whether an order could now be placed under \$90, cash at mill. It is understood that the mill at St. Louis is now asking \$90, deliverable there. Old Iron Rails are quoted at \$47 @ \$48, at which rates they are much cheaper than either Pig Iron or Muck Bar. One of the larger consumers here informs your correspondent that he has 12,000 tons bought, equal to any Muck Bar in Pittsburgh, to coat about \$15 per ton less than Muck.

Muck Bar.—Has gone still higher, in sympathy with Pig Iron, and is now held at \$63 @ \$65, cash at mill, with but little offering.

Steel.—There has been no change in prices for some weeks, but they are firm, with the mills all very busy. The inquiry does not appear to be confined to any particular grade, but runs throughout the entire list.

Scrap.—There is a fair and increasing business, and prices are still tending upward; Scrap has been sold to advance here as compared with Pig Iron, but that it has gone up materially is evident to all who are familiar with the business. Quotations may be fairly given as follows:

Old Car Wheels.....gross \$44 @ \$45
Machinery Metal....." 20 @ 30
Cast Borings....." 18 @ 20
No. 1 Wrought Scrap.....net 44 @ 45
Old Car Axles....." 48 @ 50
Old Car Springs....." 42 @ 43

Window Glass.—The demand continues to increase, and with very light stocks and manufacturers refusing large orders, prices are still tending upward. The discount has been reduced again, and we now quote at 50¢ straight on single strength and 50 and 10¢ on double.

Coke.—There is no abatement in the demand. On the contrary, it continues to increase, and with makers pressed with orders and cost of production increasing, prices continue very firm, although we do not advance our quotations, which now are \$3 @ \$3.50 per ton, delivered on cars at ovens.

Coal.—Nearly all the river miners have resumed work at 3 1/2¢ per bushel, the operators refusing to pay the advance demanded, and for the time being all is quiet in the Monongahela Valley. The down-river markets are well supplied and prices are easy. At New Orleans the price of Pittsburgh Coal has been reduced. At Cincinnati, Zanesville and all points along the river prices are lower, and our Coal operators generally would like to see the Ohio River freeze up and remain so for two or three months.

REVISED PRICE LIST.

Merchandise Iron.
TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

Flat Bar.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Rounds and Squares.
1 to 1 1/2 inch.....4.20
1 1/2 to 2 inch.....4.30
2 to 2 1/2 inch.....4.40
2 1/2 to 3 inch.....4.50
3 to 3 1/2 inch.....4.60
3 1/2 to 4 inch.....4.70
4 to 4 1/2 inch.....4.80
4 1/2 to 5 inch.....4.90
5 to 5 1/2 inch.....5.00
5 1/2 to 6 inch.....5.10
6 to 6 1/2 inch.....5.20
6 1/2 to 7 inch.....5.30
7 to 7 1/2 inch.....5.40
7 1/2 to 8 inch.....5.50
8 to 8 1/2 inch.....5.60
8 1/2 to 9 inch.....5.70
9 to 9 1/2 inch.....5.80
9 1/2 to 10 inch.....5.90
10 to 10 1/2 inch.....6.00

Half Oval and Half Round.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Horse Shoe.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Wagon Box Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Light Bands.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Hoop Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
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1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Sheet Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
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1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Bar Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Cast Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
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1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....6.00

Cast Iron.
1 1/2 to 6 by 1/2 to 1 inch.....4.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.20
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.30
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.40
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.50
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.60
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.70
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....4.80
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....4.90
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.00
1 1/2 to 6 by 1 1/2 to 1 1/2 inch.....5.10
1 1/2 to 6 by 1 3/4 to 1 3/4 inch.....5.20

the order of the day, and we have our share of the excitement. While naturally elated at Louisville's prominence in the various moves, we are not vain enough to imagine that our city is to be coddled at the expense of other communities reached by the L. & N. R. R. Hostility to foreign capital, evinced already in efforts to compromise or repudiate the State debt, is also showing itself in inflammatory utterances at public meetings and through the press against the L. & N. in view of its late acquisitions. Such sentiments cannot but work harm to Southern industries of all kinds, and so deserve more than passing notice, while they are deplored. We congratulate ourselves that a more intimate connection with Chattanooga is assured, as that neighborhood is daily growing in importance. We want more capital for the South's development, and we must protect it carefully that it may come in abundance and come to stay.

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of February 2: Pig Iron quiet. Old Rails and Wrought Scrap very active; sales of about 600 tons Old Rails the past week. Market for all descriptions quoted below firm.

Scotch Pig Iron.....	35.00 @ 40.00
American Scotch Pig Iron.....	40.00 @ 45.00
American No. 1.....	38.00 @ 43.00
" No. 2.....	36.00 @ 41.00
" No. 3.....	34.00 @ 39.00
" No. 4.....	32.00 @ 37.00
Cold-blast Charcoal.....	35.00 @ 40.00
Warm-blast Charcoal.....	40.00 @ 45.00
Old Rails.....	34.00 @ 44.00
Wrought Scrap No. 1.....	33.00 @ 34.00
Cast Scrap Machinery.....	30.00 @ 32.00
Richmond Refined Bar Iron, Stand'd.....	60.00 @ 65.00
Horse Shoes, Tredegar.....	6.00 @ 6.50
Mule.....	5.00 @ 5.50
Old Dominion Nails (standard size) 5-13 @ 5-15.....	5.15 @ 5.85

Freights to New York, \$2.00 for 240 lbs. by rail.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Jan. 19, 1880.

THE IRON TRADE.

although not satisfactory in every respect, is in many particulars very strong, and on the whole may be said to maintain its position on the advanced lines which came into operation in the first week of the year; and so far as I am in a position to ascertain, there are few or no signs of an immediate relapse. There are, without doubt, certain symptoms at Glasgow and in Cleveland which are not by any means healthy or satisfactory, but the speculation which is prevalent in the North is to a great extent a known quantity, and is consequently of less danger than it might be under other conditions. The speculators of Glasgow are certainly plunging about rather wildly on warrants, and their operations have been largely responsible for the notable rise which has taken place in makers' brands. The latest intelligence from your side will probably enhance the intensity of the existing fever, but it is commonly anticipated that there will be an inevitable relapse before long, when a number of the dabblers will be bitten. Should the inflation attain any very considerable dimensions beyond the point already reached, the crash will be all the more severe, and may send back makers' quotations in proportion. The legitimate market, however, outside and apart from the bubble-blowing in crude iron, seems to stand its ground very firmly, and those who are, in all probability, best able to judge are of the opinion that we are absolutely certain of a much better year than we experienced in 1879, with many probabilities in favor of a great and early consumptive spurt, accompanied by proportionately higher selling rates. This view is held by many exceedingly experienced iron men, and appears to me to be as near the mark as it is possible to reach. At the same time, there are those who hold the opposite theory, and one of them, over the signature of "Iron," has expressed himself in the *Times* as being convinced that the whole of the seeming prosperity in our leading metallurgical industries is a sham, a vast and hollow mockery, which is destined to burst up almost immediately and bring ruinous consequences upon all concerned. This gentleman touches upon several of the points which favor his view of the case, especially insisting upon the smallness of the American demand and the amazing inflation which he says pervades our market. I do not, of course, presume to follow this writer through the details of his gloomy vaticinations, or to waste my space in attempting to refute his arguments; but I may as well say at once that I entirely dissent from his conclusions. It may be, of course, that I am better informed as to the actual course of the iron and steel trades, or that my temperament is just now on the sanguine side; but so far as my information goes, I can perceive abundant tokens of prosperity and very few of an early backsliding. I have, on former occasions, told you that I believe prices to have been run up too rapidly in certain branches, and I have taken occasion in prior communications to run over the various data which seemed to me to favor a policy of extreme caution; but since those letters were penned there have been many changes in an upward direction, and I have now little hesitation in stating that I believe our comparative security, on a broad and active basis, is already assured for the first half of 1880. This may seem a rather strong statement, but I have fair reasons for the inference, with every disposition to view the question from a pessimistic rather than from an optimistic standpoint. I might go even further and say that with the continuance of the really amazing "boom" in the United States we shall witness a state of affairs which few can now confidently predict, and none would be willing to admit they really anticipate. There may possibly be partial stoppages in the flow of the flood tide now and then, as has invariably been the case on previous similar occasions, but these will probably not prove lasting, unless circumstances become prominent which are at

present wholly unforeseen and hidden. Any impartial and unbiased observer of that which is going on throughout our ironmaking districts must needs be astonished at the activity and hopefulness which now prevail, but he will be none the less convinced of the reality of the change, and of its numerous indications of life and vigor. The current reports from all parts of the country are replete with items particularizing preparations for increased production; inability to meet the demand for certain sorts of materials, raw and finished; and the receipt of orders, large and small. So long as the spurt was wholly confined to crude descriptions, few persons were inclined to hope for or expect the wider progress of the upward movement, but at the present time when many of the producers of rails, ship plates, bars, sheets, hoops, &c., are actually unable to undertake commissions for near—and in some instances relatively distant—future deliveries, there are but few who remain unbelievers. The situation necessarily has certain elements of weakness and possible confusion, but the weight of our present evidence lies in the opposite direction, and I, personally, strongly incline to the belief that we are on the eve of a period of very considerable activity and prosperity. The possible causes of a relapse are, in brief: 1. The presence of speculation in raw materials and pig iron. 2. The large stocks of pig iron in Scotland and in Cleveland. 3. The comparative poverty of the home market. 4. The danger of abnormal inflation in the United States, and 5. The risk of prices being unnaturally forced up to too high a level. The first of these reasons I should not be disposed to treat too lightly, but I think it will rectify itself. The second is largely counterpoised by the fact that not only Great Britain but the Continent have been almost wholly depleted of scrap and other old materials. The third is serious, but may work round in due course with a fine summer. Of number four you are better able to speak than myself, but I take it that we need not regard the point as being unduly risky. Number five is an imminent danger, if we add to it the extreme probability of production being greatly augmented in this country. Shaken up and averaged, nevertheless, I don't see any solid reason for varying my belief, as already expressed, that we are about safe for the first half of the year, whatever may come about after midsummer. Hitherto we have depended almost wholly upon your progress, but we are all gradually emancipating ourselves from that predicament, and with the growing increase of activity among our cousins and European neighbors we now begin to feel our feet, and are somewhat inclined to boast of the achievement.

THE ELECTRIC LIGHT

controversy, which has gained redoubled intensity in connection with the most recent of Mr. Edison's inventions (as to which we have had a variety of newspaper telegrams) still excites much controversial correspondence here. Many of the experts, including Mr. Preece, of the post office, ridicule the assertions made by or on behalf of Mr. Edison, as to the capabilities of his new paper horse shoe lamp, and assert that no such results as those claimed can be obtained from the low engine power mentioned. They naturally make merry over the latest cablegram, which announces that the philosopher of Menlo Park has had to suspend his operations, owing to some defect in the horse shoes, and predict that the whole thing, from beginning to end, has been worked up as a clever piece of stock exchange manipulation. At the same time, there is a decided impression in the minds of most people that the electric light is certain to become the light of the future, and that it is only a mere question of time as to the period when it will actually be perfected. Here, it is slowly but surely gaining ground, and is having a gradually widening constituency. In the Aldersgate Street Railway Station last evening, eight electric lamps filled the place of scores of gas lamps and burned brightly and steadily, as they do every evening. The system used is the Lontin. A great tailoring establishment in Ludgate Hill has been fitted with 17 lamps on the Jacoboff principle, and there the report is also favorable, equal light being secured with an entire absence of heat. In Regent street several shops are lighted in the same way, and the Thames Embankment is so illuminated every night. The public decidedly favor the new mode of lighting.

SCOTCH PIG IRON

has been excited during the week, and a good deal of speculation has been in operation at Glasgow. The fluctuations in warrant quotations have been more noticeable than for some time past, amounting to 2/ and 3/ in one day, which is a far wider range than that which ordinarily prevails. It is probable that our most recent news from the States will again send up the market during the present week, although shipments are by no means heavy, and the production, as well as the reserve stock, is increasing. The particulars furnished by John E. Swan & Bros. show that there are 104 furnaces in blast in Scotland, as compared with 91 this date last year, and the stock in Connal's stores 428,485 tons, against 204,162 tons a year ago. Of the furnaces blowing, 47 are old style and 57 gas. Ballast pig has gone up to 55/ per ton, alongside ship, and freights to New York are 15/—the latter fact having a decided tendency to check speculative shipments. Writing on January 17, James Watson & Co. said: "The Scotch iron market has been very sensitive and irregular during the week, with a considerable amount of business done. On Monday the opening figure was 72/3, advancing to 73/1, receding to 72/4, and closing at 72/1 1/2. On Tuesday the market receded from 73/1 1/2 to 70/6, cash, a good business being done. On Wednesday the price was erratic, opening at 70/6 it declined to 60/9, then improved steadily to 72/10, cash. Yesterday a reaction set in, and the market declined from 72/9 to 70/9, cash, while to-day it opened at 70/6, declined to 70/1, then improved to 71/3, finally closing at 70/1 1/2. There has been a fair demand for No. 1 shipping brands, but No. 3 foundry iron is not in such demand." The ship-

ments last week were 6689 tons, as compared with 6699 tons for the corresponding week of 1879. We quote:

G. M. B., at Glasgow.....	No. 1.....	No. 3.....
Guthrie, ".....	75/6	74/
Coltman, ".....	74/	73/
Sammerlee, ".....	74/	73/
Langdon, ".....	74/	73/
Cariboe, ".....	74/	73/
Calder, at Port Dundas.....	74/	73/
Glenarack, at Ardrossan.....	74/	73/
Eginton, ".....	74/	73/
Dalmellington, ".....	74/	73/
Shotts at Leith.....	74/	73/

Last week £10,375 of pig went to New York, and £1941 to Boston, U. S.

IN CLEVELAND

there is great and apparently increasing activity in all parts of the district, the demand for several kinds of finished iron, and especially for ship plates, being more than equal to the producing powers of the mills engaged in that branch. There are 97 furnaces in blast in the district and about 270,000 tons in stock, yet prices are firmly maintained, and vendors have apparently little or no inclination to look forward deliveries save at 5/ @ 10/ more money. Present quotations for pig, G. M. B., are:

No. 1 Foundry.....	68/	No. 4 Forge.....	65/
" ".....	65/	Mottled.....	62/6
" ".....	63/	White.....	62/
" ".....	63/	Knotted.....	62/6

All net cash, delivered f. o. b. at makers' wharves in the Tees.

In the course of the next month or so about 12 blast furnaces and 100 puddling furnaces will be added to the productive capacities of the North of England.

THE BESSEMER AND RAIL TRADES

being just now of unusual importance, both on this and your side of the Atlantic, it may perhaps be of advantage to endeavor to arrive at something like an approximate estimate of their producing powers, in respect both of ingots and finished rails. There are about 120 Bessemer converters in Great Britain, the largest being the two 10-ton ones of John Brown & Co., of Sheffield (who have six in all), down to several of 2 tons 10 cwt. in different places. In tabular form these are classed as under:

Works.....	No. of converters.....	Capacity Tons Cwt.....
Henry Bessemer & Co., Limited, Sheffield.....	2	3 0
Bolekov, Vaughan & Co., Limited, Middlesborough.....	4	8 0
John Brown & Co., Limited, Sheffield.....	2	10 0
Brown, Bayley & Dixon, Sheffield.....	4	8 0
Chas. Cammell & Co., Limited, Sheffield.....	4	4 0
Wearside Iron Company, Tynemouth.....	2	7 10
Steel Company of Scotland, Glasgow.....	2	3 0
Samuel Fox & Co., Limited, Sheffield.....	2	3 0
Lloyds, Foster & Co., Walsby, North Lincolnshire.....	4	3 0
Bolekov, Vaughan & Co., Limited, Middlesborough.....	4	6 0
L. & N. W. Railway Company, Crow.....	2	3 0
M. S. & L. Railway Company, Bolton.....	2	3 0
Mersey Steel and Iron Company, Liverpool.....	10	5 0
Manchester Steel, &c., Company, Manchester.....	4	3 0
Barrow Steel Co., Barrow.....	18	6 0
Dowla's Company, Dowla's.....	2	7 10
Ebbw Vale Company, Ebbw Vale.....	4	6 0
West Cumberland Iron and Steel Co., Workington.....	2	8 0
Steel, Tozer & Hampton, Limited, Sheffield.....	2	7 0
Carnforth Hematite Iron Company, Limited.....	2	6 0
Patent Shaft and Axletree Company, Wigan.....	4	3 0
Moss Bay Hematite Iron & Steel Co., Workington.....	2	7 0
Rhymney Iron Company, Rhymney.....	2	8 0
Wilson & Cammell, Dronfield.....	6 (7)	8 (7) 0

Out of these the following only have rail mills: 1. Bolekov, Vaughan & Co.; 2. John Brown & Co.; 3. Brown, Bayley & Dixon; 4. Charles Cammell & Co.; 5. Glasgow Company; 6. Samuel Fox & Co.; 7. London and North-Western Railway Company; 8. M. S. & L. Railway Co.; 9. Mersey Steel Company; 10. Barrow Company; 11. Dowla's; 12. Ebbw Vale; 13. West Cumberland Company; 14. Steel, Tozer & Co.; 15. Moss Bay Company; 16. Rhymney; 17. Wilson & Cammell. Speaking roughly, and with no precise official data before me, I should be inclined to think the following a pretty fair estimate of the average separate and aggregate annual output of these mills:

Works.....	Tons weekly.....	Tons yearly.....
Bolekov, Vaughan & Co.....	2,000	100,000
John Brown & Co. (see below).....	3,000	150,000
Brown, Bayley & Dixon.....	1,000	50,000
Charles Cammell & Co.....	1,500	75,000
Glasgow Company.....	2,000	100,000
Samuel Fox & Co.....	2,500	125,000
Mersey Steel and Iron Company (see below).....	700	35,000
Dowla's Company.....	1,000	50,000
Ebbw Vale.....	1,000	50,000
West Cumberland Company.....	500	25,000
Steel, Tozer & Hampton.....	1,200	60,000
Moss Bay.....	500	25,000
Rhymney.....	700	35,000
Wilson & Cammell.....	1,500	75,000

Total estimate for year..... 755,000 This statement is, of course, affected by the circumstance that John Brown & Co. have not worked their mill for some years, and that its full capacity is much larger than my figures; by the fact that Samuel Fox & Co. have not done much of late; and by the complete idleness of the Mersey Steel and Iron Company's plant. Roughly, however, we have an estimated total product of about 800,000 tons yearly. Last year our exports of steel rails reached 328,425 tons, and of iron and steel rails together, 384,029 tons. During the early part of the year few of the works were busy, had which been the case the steel rail exports would have been nearly 500,000 tons, leaving us a home consumption of, say, 300,000 tons. So far as I can see, these figures are not likely to be greatly altered during 1880, and with such data in view, I confess that I cannot see how we are going to supply you alone with all the rails you are said to need. The home demand is likely to be larger than last year, and wants are considerable, so that if you should need anything extraordinary, I fancy you will be compelled to go elsewhere for them—and pay heavily for the privilege, too. Prices are rapidly going up already—indeed,

I have quotations now before me which give £9. 5/ @ £10. 5/, net cash, for steel rails, and say that "orders are difficult to place," even at these rates.

SHEFFIELD

does not yield many items of moment just now, but it is satisfactory to be enabled to report that almost every branch of business in the town is improving. Even the lighter industries, which had experienced little or no benefit from the revival prior to Christmas, are now beginning to "pick up" and giving evidence of their renewed vitality and capacities for almost indefinite expansion. All the heavy trades are well engaged, particularly the Bessemer, tire, plate and hoop mills. John Brown & Co. have put down a Siemens furnace, of which several of their neighbors possess a number. Samuel Fox & Co. have a Midland Company's order for rails in hand; Connell & Co. are rolling rails for India. In the cutlery departments activity is not general, but there are instances in which a considerable turnover is being effected. Joseph Rodgers & Sons are sending knives and forks to your market, as well as carvers, some of which are hafted with small self-tips, tinted or colored in a pleasing manner. Harrison Bros. & Howson are also sending out consignments of some value. George Wostenholme & Son are doing a very good business in their well-known pocket cutlery, and Brookes & Crookes are in receipt of more numerous and larger orders than for some years past. John Wilson is dispatching heavy loads of his butchers', shoe and other trade knives, and is understood to have some months' work assured already for your buyers. In the steel branches a similar state of things obtains, almost all the houses whose brands are favorably known in the United States giving excellent reports of their actual transactions and prospective relations with your market. The file and saw departments are a little better, but the spurt does not seem to have seriously affected them as yet.

THE HARDWARE CENTERS,

chief among which are Birmingham, Wolverhampton, Willenhall, Walsall, Dudley, Tipton, West Bromwich, &c., are fairly well engaged, although there is not that pressure or superlative feverishness which is the leading characteristic of the iron trade. In the home trade travelers are only just getting on the road after the holidays, so that they have not yet been enabled to feel the pulses of their customers; but there are many reasons for supposing that few of them will secure orders of any size during the current quarter. Ireland, for instance, is not likely to give good results so long as the western side of that island remains in its present unsettled and extremely poor condition. From abroad the demand for general hardware is growing, especially from India, South Africa, Brazil and the Antipodes. From Australia and New Zealand, for example, the indents received last mail were better than for some months past, and the most recent advices from close colonies speak hopefully of the effect upon their raw materials of the rise in prices here. Some chagrin is felt, of course, that the colonists should show so decided a preference for many lines of American hardware. One Birmingham merchant had a single order for £1500 worth of your wares last week. American glass ware is also stated to be finding much favor in Australia, and is alleged to be 40 to 50 per cent. cheaper than English. For Canada, spoon and fork blanks are in request, rather than the finished articles, on which the duties are heavy. The wrought tube manufacturers are busy, and their men are working full time, the foreign orders being from Germany, Canada, Australia, Russia and Italy. In many sorts of hardware quotations have gone up 5 to 10 per cent. within the week.

FOREIGN.

(Monteur des Interests Materials.)

PARIS, Jan. 18, 1880.—Metals.—The return of cold weather has interrupted somewhat the revival in trade that had been manifesting itself. Copper.—This metal has been firm, with a moderate demand. We quote at Paris: Chili Bars, 175.50 @ 177.50; Ingots and Slabs, 182.50; Best Selected, 185, and pure Corocoro Ore, 175.50. Manganese remains steady. Tin.—Small refined ingots, 180; Sheathing, 180 @ 190; Bolts, 200. Tin has remained firm. English has advanced 1.25 francs the 100 kilos. We quote: Banca and Billiton, 247.50; Straits and Australian, 244, and English, 246.25. Manganese is firm. They quote: Banca, 230; Straits, 245; French, 255, and English, 255. Lead has been tending upward. We quote the same here, 49 @ 50. Manganese is also firm. They quote: First and Second Fusion, 46 @ 47.50; Antimonial, 46, and Sheet Zinc, 52. Spelter.—A fresh advance of 50c. has been established here. We quote the same, 54.50 @ 55, and Sheet Zinc, 62. The situation remains a favorable one at Marseilles. They quote: Sheet Zinc, 61 @ 62, and Old Remelted, 57 francs. Iron.—There has been little doing in this city during the week. Nothing is doing in the way of building; the only activity still perceptible is in foreign orders; local consumption of Merchant Iron has ceased altogether. Mr. Bonnetfond has just received an order for railroad cars from Andalusia in Spain, while Messrs. Biffel & Co. have undertaken to build the iron bridge at Lacres, Spain. There is a good demand for Pig Iron; the same relates to stoves and heating apparatus, no order for which can be filled in all this month. Iron Pipe is quite scarce. Old Rails are all concentrated in the hands of Mr. Bonnetfond; the same relates to stoves and heating apparatus. The Americans are still buying in Belgium, where Old Rails are selling at 11.50 francs, delivered on board ship at Antwerp. The Montataire forges have raised their price for Merchant Iron to 19 francs, first quality, and to 20 francs for Flooring Iron. Transportation being reorganized in the Ardennes, prices will return to their normal level. Orders for Merchant Iron have not been plentiful. Foundries are short of supply, especially those occupied in turning out heating apparatus. In the Haute-Marne, Pig Iron has been advancing for some time past, No. 3 now being held firmly at 55 @ 57 francs, while Moulage has also been raised in price; in fact, the whole line of cast iron, architectural and other work has also been raised 10 francs per ton, and highly ornamental ditto, 15 francs. In the Morbihan and Moselle, Pig Iron sells with great ease, stocks rapidly decreasing. At Lyons and St. Etienne, rates are firm, the demand being steady. The basis of 17 @ 18 francs is sustained. Coal.—The temperature has been fluctuating a good deal during the past four weeks, influencing the price of Coal continually. The same may be said of transportation, causing great irregularity and no well defined tendency.

BELGIUM.

(Revue Industrielle.)

BRUSSELS, Jan. 18, 1880.—Iron.—People in the iron trade are carried away by the current of improvement, which has again set in with the advent of the new year, and this movement is accom-

panied by a certain amount of excitement, against which the trade papers have again begun to warn the engaged in it. No. 1 iron has reached the price of 21.50 francs; Sheet Iron, 25.50; Steel Rails, 26; Scotch Pig Iron, 9.80; Affinage, 9.50, and Moulage, 11.50. The consequence of the extraordinary rise here is a renewal of alarm, this way from various quarters. The articles most favored by the improvement is Merchant Iron, Rails, Heams and Sheet Iron, but the greatest advance has been in Pig Iron. The government has even ordered to come forward and order the locomotives they stand in need of as soon as possible, inasmuch as the terms may soon become highly unfavorable. The fact is government lines of railroads are deficient in rolling stock, not only as regards freight cars, but almost as much in the matter of locomotives. The recent gain in freight has sufficiently shown this. While the dull times lasted, it is true our government has been all along during five consecutive years a most active purchaser of railroad material of all kinds, including locomotives, and in doing so it has powerfully assisted our prosaite industries, with great advantage to its own interest, prices then being ridiculously low. But the advance last fall in prices of everything came so suddenly that the administration at first hesitated in completing its plan. Hence, a delay in buying Rails proving highly injurious, since much higher prices have had to be submitted to afterward. Coal.—The adjudication of Coal deliveries to the state has put a very high price on this fuel for the present, and everybody holds back. This improvement is not only sustained since then, but it seems that we are on the eve of a further advance, notwithstanding the termination of the Borinage strike, if steel Coal selling at 15 francs, small Coal at 10.25, best quality large Coal at 22.25 and Coke at 25.50.

GERMANY.

(Borsenhalte.)

HAMBURG, Jan. 17, 1880.—Metals.—The extraordinary rise in the iron market has to some extent been checked by business in this branch, nobody wishing to be much engaged ahead. This was to be foreseen. The iron works are busy without an exception, although capable of turning out more than they were able to do in former years, in consequence of the many reforms and extensions they have made since 1873. The Mendels and Schwerte works have now got a new train in their rolling mills on the Lauth system. After all the old orders at low prices shall have been worked off, these and other works will be fully prepared to meet the market, whatever it then may be. Locomotives for passenger trains are now selling at the high price of 54,200 marks apiece. Copper fluctuations have been so violent and so continual under speculative influences that consumers in the Berlin market have been somewhat taken aback, and they now operate hesitatingly. English and Australian have been selling at 74 @ 76.50 marks the 50 kilos., and Mansfield at 75.50 @ 76. We are firm here at 75 marks for Mansfield. Tin.—This metal remains in good position. Berlin quotes Banca, 75.50 @ 76, and English, 98 @ 99 marks. There is nothing doing here, and prices are nominal. Lead.—The position of this metal has vastly improved in the German markets. Berlin now quotes 18.75 @ 19 marks; we quote here, German Pig, 19.50 @ 20; English, 21.50 @ 21.40, and Spanish, 21. Spelter.—There is great interest noticeable in the German market. Breslau as much as 20.15 has been paid. We quote Spelter on the spot here, 19.50 @ 20; to arrive, 20 @ 20.50, and sheet zinc, 26.50 @ 27. At Berlin, Spelter we quote scarce on the spot at 25 @ 27, while to arrive nothing can be had, producers wishing to sell, because they expect much higher prices.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Jan. 18, 1880.—Iron.—The improvement in the iron market has been making further headway during the week under review. Hardly a day passes without the announcement that some particular article has again been raised in price. Thus, for instance, Bar Iron is again higher by half a florin the 100 kilos., and a further advance seems to be impending. Without taking too sanguine a view, we believe we are safe in forming the opinion that we are on the eve of still better prices in the near future. The producers of Merchant Iron have taken the lead in that direction, and it now depends on consumers and the amelioration just inaugurated can be sustained or not. The Laibach Industrial Company has put up the prices of Spiegeleisen and Ferromanganese in consequence of an active demand for Bar Iron and America. Metal prices are well sustained in Austria, notwithstanding the hesitation exhibited by consumers in replenishing supplies. They will, however, soon be forced into the market by their necessities, stocks having run down very much in their hands. Speculation is active. We quote at Vienna Soft Pig Lead, 22.50 @ 23.50 florins the 100 kilos.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PENANG, Dec. 15, 1879.—Tin.—After the departure of the last mail Tin touched \$37.80, gradually declining to \$36.60 @ \$36.75, but again recovered to \$37 @ \$37.15. A small business has been done for London and America. Purchases for the former amount to 500 piculs, and the latter, 2740 piculs, and by Chinese for India and China and on speculation, about 300 piculs at \$37.50, \$37.75, and \$38. The market is somewhat upheld by Chinese speculators, and closes firm at \$37.20, with a stock of about 1000 piculs. Exchange.—At the commencement of the fortnight uncertainty for the German prevailed, slightly firmer news coming from India. Rates here remained nominal, as at the close of the previous mail. This position was followed by the report of a depression in silver at home, owing to large sales in Italy and rumors of a contemplated suspension of coinage in America. This led to an anxiety on the part of the banks to secure private bills. The anxiety was then further increased by an announcement that the German government intended to renew sales of silver. This has, however, been officially contradicted at Berlin, and in consequence a firmer tone prevails, while in China rates have slightly advanced. We quote at the close, 3/10 3/4 @ 3/10 3/8.

Neglecting Tariff Interests at Washington.—A correspondent of the Philadelphia North American says: It is a matter of wonderment among the tariff members of Congress why the manufacturers of the country, and especially the iron and steel interests, are not represented at Washington, when by all means they should be. The free traders send their most polished, influential and brightest agents here, who readily drift into the currents of social life and take advantage of their positions to poison the minds of Congressmen and imbue them with their ideas. Legislation here is largely obtained through social influences, and the anti-tariff advocates and British manufacturers having plenty of money to spend, do spend it lavishly right here in Washington. How neglectful are the American manufacturers! A few years ago they appointed the well-known tariff and commercial writer, John M. Norton, as a sort of agent here to advocate their interests, and they paid him so miserably that Judge Kelley found him living in a bare room and subsisting on bread and apples. During the sessions of Congress the office of Mr. Swank, secretary of the National Iron and Steel Association, should be transferred to Washington. Such a man as Swank, who is one of the best posted men on iron and steel in the country, could do a heap of good. Before the Pennsylvania metal men are aware of it the free traders will strike them a deadly blow in Congress, and then there will be a general howl all along the line. The eye cannot be shut to the fact that the doctrines of the free traders are making rapid headway among our public men outside of the Keystone State, and some movement should be put on foot to counteract it.

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 18, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, also responsible dealers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

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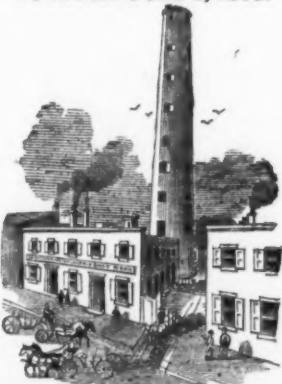


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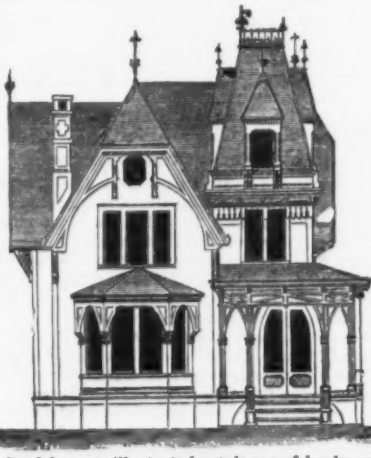
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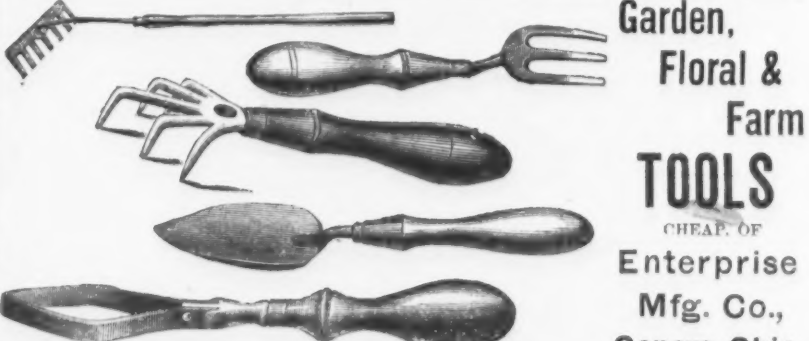
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Standard Sizes in Cylindrical Fitting.

Mr. George Richards, who is prominently connected with the manufacture of standard gauges, just commenced in this country, has read before the Franklin Institute a paper on the use of standard gauges in cylindrical fitting, from which we take the following:

It seems now to be generally conceded that standard gauges are no longer to be regarded as a luxury, but an essential part of an equipment for manufacturing machines. Their low price, together with the advantage gained by their use, being more generally understood, will account for this. Until recently attention has been diverted to the means of establishing sizes and testing the accuracy of finished parts, but since a source of trouble has arisen in many cases where it was assumed that the possession of standard gauges alone accomplished the desired results, some further means of maintaining the size seems to be called for.

Every one at all acquainted with shop manipulation is fully aware of the fact that before much can be accomplished in the right direction, the holes in the various parts of machines must be finished with some degree of uniformity, to permit of gauges and proper mandrels being used to advantage. Having been obliged from circumstances to base most of the precedents in this manufacture upon the English system of work, in which standard gauges have for many years been very generally employed, the fact was partly overlooked that in their practice holes were bored to size, while here reaming tools were almost universally adopted. To explain the cause of the difficulties which necessarily arose where reamers of the usual type and gauges were used together, attention is called to an example of such a reamer. It consists of a piece of hardened steel with cutting edges about one-half its length, while the other is of cylindrical form (called generally the "shank"), serving in most cases as an extension or handle to reach through deep holes. The cutting edges are ground to finish a hole to standard size when the implement is new. It is no doubt intended that the shank shall be a guide for the cutting edges, after they are fully entered in the hole being reamed, but it will be readily understood that the cutting edges being continually subject to wear, to make a commercial success of such a reamer the shank must be small enough to pass through the hole made by it, without reference to the amount of wear that may occur from continued use.

From this it will be seen that such an implement, without any means of maintaining its original size, can have no reference to standard sizes, except when first used. As the holes made in this way gradually diminish in size, the gauges will not enter the holes, the diameter of cylindrical pieces must also be reduced, and proper mandrels of steel cannot well be employed. The results will, in most cases, be a worse confusion than if no system were attempted at all. It is of course suggested that such reamers be annealed, reset, hardened and ground; as special skill is required for these operations, they rarely receive such treatment, but as many here can testify, are instead reduced to another size.

For these reasons, it has become necessary to supplement the standard gauges with some implement to produce holes to uniform sizes, and the manufacture of an adjustable reamer of the type at present employed in some of our leading shops, has, therefore, been entered upon. The reamer consists of a steel body with inserted blades, upon which the cutting edges are formed. The grooves in which the blades are fixed are not parallel with the center, but at such an angle, that the blades being forced towards the shank, the diameter of the outside of the cutting edges is increased. Such reamers have from time to time been made, with the usual appliances at their command, by those shops where a system of uniform sizes has been adopted, and have no doubt formed the principal means of maintaining such a system after being begun.

The feature of adjusting the size of a reamer as it wears, brings an entirely new set of conditions to bear on the matter (when compared with the solid ones). It permits of a uniform difference being constantly maintained between the diameter of the cutting edges and the shank. In this case the shank can be utilized as a means of guiding the cutting edges, to insure straight holes being formed, and still further form a means of determining the wear to be permitted, as it becomes a check to the use of the reamer when it requires readjustment. Inasmuch as different grades of fitting will allow of more or less variation in the holes, this limit of accuracy, as it may be called, can be regulated with some degree of certainty.

This form of reamer has always been considered difficult to make, owing to the nature of the fits, but with a view of reducing their cost, to allow of their being generally used instead of the solid reamers, it was necessary to base their manufacture upon milling the dovetail slots uniform in size, and producing the blades without reference to their final disposition in any one reamer. The blades are fitted to drive tightly, so as not to be altered in position by any rough usage they may be subjected to. The blades being interchangeable, they can be renewed when worn to the limits of end adjustment. The plan holding the blade by tight fitting has an object, in preventing the size of the reamer being tampered with by unprincipled workmen, and to insure that it is altered only when worn sufficient to require readjustment. Messrs. Wm. Sellers & Co. have adopted a very good plan in their reamers for this purpose. The blades are driven out from the shank to expand the size. The blades are then ground "flush" with the ends of stock, showing at a glance if the blades occupy their proper position. This plan, however, presents some difficulties in the manufacture of the reamers that overbalances this advantage; any convenient method of adjusting the blades would thus seem a detriment. It might be explained, that in perfecting mechanism to insure this interchange of parts, an equal number, if not more, difficulties have been encountered than in the making of the gauges. The work is required to be uniform to about the

one five-thousandth part of an inch, which is comparatively a much closer degree of accuracy, where results are based on the maintenance of cutting tools, than in the gauges, where the sizes are obtained by grinding and many tests are made.

In beginning the making of cutting tools to be used in finishing working parts of machines, a step was taken outside the province of gauge making, which had only been directed to furnishing standards to make work to, leaving it to the discretion of the user to determine how the finished parts should fit with the gauges. There had always been some misgivings about this matter, from noticing results after standard gauges were employed, and upon further inquiry, quite a difference of opinion was found to exist.

The question is what relation shall the size of holes in machines bear to standard measurements; or, in other words, shall holes be made above, exactly to, or below standard sizes? In order to cause the argument to be more readily followed in entering into details, it will be proper to call attention first to the conditions that must exist in any practical attempt to produce parts exactly similar. Different classes of manufactured products call for more or less uniformity in their parts, the controlling element in most cases being the destruction of the cutting edges, coupled with slight inaccuracies in the working details of the mechanism actuating the tools. There is a defined limit to this matter of making parts duplicate and interchangeable in machines, based upon conditions so numerous that no attempt will be made to point them out here. Even when satisfactory results are arrived at the sizes of duplicate parts can at best be only an approximation to some arbitrary or standard size, but should at all times be within some defined limits, the degree of accuracy established for the work being an exponent of this. This variation then represents the change which tools may be permitted to undergo and yet remain in use for a specific purpose.

It is a matter of much importance to arrive at some very definite conclusions about the relation that the sizes in machine fitting should bear to standard sizes. It has been pointed out that, with proper appliances for making the holes, they become the basis in carrying out a system of uniform sizes. Should the implements for finishing the holes be adjusted at first with an allowance made for their wear to make the holes larger or exactly to a standard size hole?

The difference in the two cases is more than would at first be imagined, and in actual practice is of sufficient moment to warrant the assertion that, even with similar standards in each shop throughout the country, there cannot be said to exist any uniformity in the sizes of their finished product. The difference in the results will at all times be double the limit of accuracy that is assumed in fitting.

The nature of the surfaces on a pin and ring gauge permit of their both being very nearly the same size. One ten-thousandth of an inch difference in either would make a marked change in the fit. Inasmuch as the close fitting of gauges cannot be carried into practice, either the internal or external gauge must be assumed as a shop standard. Everything pertaining to the duplications of standards requires that the external gauge, or a length standard, be assumed as a basis. The standard lengths of Great Britain, adopted by our government, are bars with points, the outside dimension being the standard length. In reproducing duplicates, measuring points are brought in contact with the ends, and the distance between them assumes the form of a gauge for that purpose, but not of a standard length. Referring now to the interchange of different forms of standard gauges, the length standards are represented by pin gauges, the corrective gauge disks and the "heel," as it is generally called, of the fixed caliper gauge, while outside measures for transmitting these lengths are represented by the measuring machine, the ring gauge and the fixed calipers. The latter implements indicate a standard size plus two contacts, or in the case of the ring, of a continuous contact. The amount of surface contact becomes of much moment in the fitting of standard gauges, owing to the nature of the surfaces and the density of the material employed. The distance measured between the points of a fixed caliper gauge is less than the internal diameter of a ring gauge indicating a similar size, because of the small amount of surface in contact in the former. Again, the internal diameter of a cast-iron ring gauge must be greater than one of hardened steel, each appearing to fit the same over a cylindrical gauge. This difference is even more when both are fitted to a pin gauge of cast iron. From these few examples it will be understood that the duplication of gauges is based upon assuming outside dimensions as the standard. For these reasons it has been thought best to recommend that in fitting the size of the holes should be above standard sizes enough to show a contact with a standard size shaft similar to the apparent fit of the gauges with one another. To refer again to the variations in duplicating parts, as representing only an approximation at best, the different degrees of fitting must now be brought to bear on the matter. Even if holes are assumed to be made uniform, the size of cylindrical parts must be varied to produce the different contacts referred to in the gauges.

In practice, fits are divided generally into three kinds: first, a driving or forced fit; second, a close contact or exact fit, and third, a fit loose enough to permit of the surfaces being lubricated by the ordinary means. To now bring the three conditions that have been explained together: the standard gauges in their various forms; the variation that must occur from wear of tools to form holes, and the different grades of fits employed in practice, it would appear that to suit these conditions most favorably, the slight variation permissible in the holes, compared with a standard size shaft, should represent the fit described as a close one—neither a loose nor forced fit. Compared with the gauges now, this fit would show a similar contact with them, the fixed caliper going easily over the shaft, and the "heel" of the gauge entering the hole apparently with a similar contact of the shaft. If the fit were

a forced one, the shaft would be larger than the gauge, and if a loose fit, smaller than the gauge. Provided the cylindrical parts of machines were prepared in this manner, without reference to the holes, the variations that must be made in their size to fill the conditions of the different fits is so much more than the variation that should be permitted in the holes, that practically no difference would be noted, whether the size of the hole is at one extreme or the other. To again call attention to the adjustable reamer, as perhaps affording further explanation, the shanks of the reamers are duplicates of standard cylindrical gauges, while the extreme diameter of the cutting edges is the standard size plus the variation or limit of accuracy assumed in the work. The shank at once assumes a new condition as a part of the reamer. It can be considered as a guide to insure straight holes, but its most important function is as a check, to limit the use of the reamer when it has diminished from its original size to the smallest diameter that is permitted from the degree of variation assumed in the fitting. Practically, this forms the only safe means of controlling the sizes in a shop, without continued attention on the part of the manager. Without such an implement, the conditions of fitting referred to would be impossible, and standard gauges could be utilized only to a limited extent in fitting.

Mandrels should receive some attention as having a bearing on the matter. When properly used, they should be divided into two classes, for long or short holes; in one case being made straight about one-half their length, with a taper on the remaining part, in the other with a gradual taper from end to end. One end of them will in either case be to standard size, as the holes cannot be made too small to prevent their being entered.

SCIENTIFIC AND TECHNICAL.

We have had occasion to refer in previous issues of *The Iron Age* to the efforts made by M. Camille Vincent to create a market for chloride of methyl, by teaching its value for certain applications in the arts. His latest attempt is to introduce the use of

CHLORIDE OF METHYL FOR EXTRACTING ESSENTIAL OILS.

The process is based upon the property of that substance to dissolve fats, resins and essential oils. The first experiments succeeded so far as the extraction went, but the product obtained had a disagreeable odor, caused by the presence in the commercial chloride of methyl of traces of some impurity. This impurity he succeeded in eliminating by treating gaseous chloride of methyl with concentrated sulphuric acid. He extracts the perfume from flowers in the following way: They are digested for two minutes with successive charges of chloride, repeating the operation a number of times. Finally, the digesting vessels are exhausted, and the chloride, which carries with it the volatile essential oils, is obtained in a gaseous state. This mixture is condensed, and the resulting liquid is heated to 86° F. in a vessel from which the chloride of methyl is exhausted by means of a vacuum pump. The chloride is thus separated from the perfume, which is contaminated by fatty and resinous matter. The latter is extracted by means of alcohol.

Herr J. J. Hess, of Vienna, claims to have developed a good method for

COATING METAL GOODS WITH BRASS

by electricity. He states that the greatest trouble experienced hitherto in accomplishing this has been to obtain a bath which has the power of dissolving both copper and zinc well, so that alloys of the two may be dissolved and deposited uniformly. With former solutions too strong a current would yield a grayish deposit of zinc, and too weak a current would give a pale reddish color, while in the most favorable case a poor yellow was obtained. He prepares his solution in the following way: Dissolve 84 parts, by weight, of bicarbonate of soda, 54 parts of chloride of ammonium and 13 parts of cyanide of potassium in 2000 parts, by weight, of water. Then cover the sides of the vessel containing the bath with sheet brass, cast, not rolled, and suspend a sheet in the bath, the former acting as anode and the latter as cathode. After allowing the current to pass through for an hour, the bath will be prepared for any objects to be coated with the same alloy.

Herr Krupp, of Essen, Germany, has recently patented in Germany a method of

WELDING TUBES AND TIRES.

which is based upon an excellent idea, although the practical details recommended by him do not strike us as being very well elaborated. He draws the tube over one of a pair of ordinary rolls, and then heats the whole length of the portions to be welded by a special contrivance, which is a portable fire-box, into which air is so blown that the heat is directed against the weld. After the necessary heat is attained the rolls are set in motion and the place to be welded is repeatedly drawn through them. His heating apparatus appears to us clumsy, and could, we believe, be replaced to advantage by some gas apparatus similar to that used for heating wagon tires in this country and in France.

The Montreuil Industriel describes

A CHEAP FIRE ALARM

which has been invented by M. Brasseur, who claims for it the advantage of being capable of working both when a fire spreads rapidly and when it makes headway very slowly. The apparatus consists of two tubes made of sheet zinc, both covered on the outside with lampblack. They are attached, in a vertical position, to a cast-iron bed-plate, their upper ends being separated by a copper plate which, as a rule, is kept at a certain distance from a contact screw. This screw is connected with one pole of an electric battery, while the copper rod is connected with the other, an alarm bell being in the circuit. One of the two tubes is empty, while the other is filled with tallow and is closed with sealing wax. As soon as a sudden increase of temperature takes place the empty tube will be heated more rapidly than the other, and in expanding will bend and bring the copper rod into con-

tact with the screw, causing the bell to ring. But if the fire spreads slowly, the heat will expand both tubes simultaneously, until the temperature of melting tallow is reached. The tallow in the tube will become liquid, and therefore keep the latter from expanding as quickly as the empty tube, which in this case also begins to bend, and thus also rings the alarm.

Dr. Woodbury is the inventor of a simple and effective method of producing

PHOSPHORESCENT PHOTOGRAPHS.

He exposes a plate coated with a mixture of dextrine, honey and bichromate of potash under a negative, the result being that those portions which are exposed to the effect of the light through the transparent portions of the negative harden, while those which are protected from the light remain adhesive. The lines of the image, therefore, will retain any fine powder which is dusted over it, while the lead portions will not retain it. Dr. Woodbury uses as a phosphorescent powder, sulphate of lime, which, adhering to the unchanged portions of the film, will produce a picture that can hardly be distinguished in daylight from an ordinary photograph, because the substance used is almost entirely white. In the dark, however, having been exposed to sunlight or any strong artificial light, a luminous picture will be produced which is said to be very striking.

Mr. Barnard S. Proctor, of Newcastle, England, in a letter to *Engineering*, claims for Mr. J. S. Swan the priority of invention of the use of

PAPER CARBONS FOR ELECTRIC LAMPS.

He says that many years since Mr. Swan prepared carbon from paper, having ignited it in a potter's kiln. The carbons he produced at that time were gray, with something of a plumbago luster, sonorous and with sufficient elasticity to bear slight flexure. By passing the electric current through one of these under an exhausted receiver he obtained a beautiful electric light for a short time, the breakdown of the carbon being the result of an imperfect vacuum. Mr. Swan expressed his conviction that this method would ultimately become the most practical mode of obtaining a steady and useful electric light. A year or two ago he resumed experiments in this direction, the chief difficulty to be overcome being the removal of the troublesome atmosphere of the lamp. His improved Sprengel pump (Swan and Stearn's) and other means which he has taken to improve the vacuum, now promise to yield a light of satisfactory permanence as well as of great steadiness and beauty.

According to a recent German patent, taken out by M. Dronier,

MALLEABLE BRONZE

may be obtained by the addition of a small quantity—from ¼ to 2 per cent.—of mercury. The action of the mercury seems to be rather mechanical than chemical, and it is not necessary that the mercury be mixed with the composition of the alloy. It may be added to either of the metals of which the alloy is to consist (being poured into the fused metal and stirred with it); or it can be introduced along with the tin, or soon after it, into the copper bath. Especially good results are obtained if a warm mixture of tin, with 1 to 2 per cent. of mercury, be formed and added to the melted copper.

Herr Eden, in a communication to the Vienna Academy of Sciences, gives the details of

A NEW CHEMICAL PHOTOMETER,

which is based upon the observation that chloride of mercury is very easily reduced to insoluble chloride in sunlight whenever it is mixed with organic substances. The sensitive solution he uses consists of two volumes of a solution of 40 grams of oxalate of ammonia in one liter of water, and one volume of a solution of 50 grams of sublimate in one liter of water. In sunlight turbidity is immediately produced, the action of the light being weaker as the solution is more dilute. Herr Eden has furnished tables for the corrections necessary to allow for the influence of increasing dilution and varying temperature on the quantity of the chloride of mercury separated by the photo-chemical process of decomposition.

Col. Scott's New Project.—The proposition of the Pennsylvania Railroad Company to lease the Louisville and Nashville combined lines, reported recently, has been rejected by President Standiford and Vice-President Newcomb, on the part of the latter company. Mr. Standiford said recently that the proposition was not a new one. It was made once before, some months ago, and was then declined for reasons similar to those which influenced its rejection now. The stockholders of the Louisville and Nashville Company would never consent to such an arrangement, and it would not be for their interest to do so. Negotiations of a modified sort are, however, now in progress, looking toward the joint control of the Louisville, Cincinnati and Lexington Line, between Cincinnati and Louisville, which would give the Pennsylvania Company a direct connection with the lines of the Louisville and Nashville Company, and thus accomplish the proposed combination of interests in another way, although both companies would continue to be entirely independent of each other so far as their management is concerned. The story put forward on the street that the Louisville and Nashville people intend to include the South Carolina Railroad in their combination is officially denied. This road is in the hands of a receiver, and it would require, besides, the building of 160 miles of additional line over the mountains to make the necessary connections.

As originally proposed, the Hudson River Tunnel would have been a simple bore, large enough to accommodate two railway tracks. Lately the company have changed their plan, we are informed, and there will be two small bores instead of one large one. These will be bored throughout with 34-inch iron plates. One reason for the change is that small tunnels will be stronger than a large one. The tunnels will meet and overlap about a foot. When they meet, the brickwork will form a partition and hold up the structure so that it will sustain a great pres-

sure from above and from the sides. It is believed that the workmen can proceed faster than by the old method, and that the work can be sooner completed than was at first anticipated. The brickwork will be begun next week.

LABOR AND WAGES.

The railroad miners at Pittsburgh have withdrawn their absurd scale, based on the price of boiling iron, but have adopted the following:

Whereas, The River Convention of last Saturday deemed it inexpedient to strike for 4 cents; and,

Whereas, The river coal is continuing to fill railroad contracts by fully supplying the mills and factories of Pittsburgh; be it

Resolved, 1st, That this convention consider it useless to continue the strike for the present scale; 2d, that the general secretary be ordered to modify his scale to \$3.62.5 when card rate is 4 cents, with a 2½-cent minimum; and,

Whereas, Complaints are being made by members of the Amalgamated Association of the iron and steel workers, that to base our scale on the price of puddling is onerous and unjust to them; therefore, be it

Resolved, That in deference to the wishes of the iron and steel workers, the general secretary be furthermore ordered to base the modified scale on the card price of the Western Iron Association.

Resolved, That the following scale be adopted:

Card rate on iron per lb.	Mining price per 100 bushels.	Card rate on iron per lb.	Mining price per 100 bushels.
2.50	\$2.50	4.1	\$3.75
2.6	2.55	4.2	3.82
2.7	2.60	4.3	3.92
2.8	2.65	4.4	4.02
2.9	2.70	4.5	4.12
3.0	2.75	4.6	4.22
3.1	2.82	4.7	4.32
3.2	2.90	4.8	4.42
3.3	2.97	4.9	4.52
3.4	3.05	5.0	4.62
3.5	3.12	5.1	4.72
3.6	3.22	5.2	4.82
3.7	3.32	5.3	4.92
3.8	3.42	5.4	5.02
3.9	3.52	5.5	5.12
4.0	3.62		

The operators have refused to adopt this scale in the following resolutions:

Resolved, That on the present price of coal, viz., 7 cents per bushel, f. o. b. cars on wall track in Union yard, in this city, the members of this Exchange will pay 3½ cents per bushel for mining coal run over a 1½-inch screen.

Resolved, That the members of this Exchange will agree, if miners so desire, to work on the scale of prices based upon the price of coal as adopted by this Exchange January 14, 1880.

Under the 4¢ card in iron just adopted at Pittsburgh, boiling is \$7.25 per ton; Bar heating and rolling, 97¢, and Nail Plate rolling, 87¢ per ton.

The laborers at Jones & Laughlin, Pittsburgh, went on a strike last week for an increase of wages to \$1.50 per day. After being idle for several days, and causing the stoppage of the entire works, throwing some 1500 men out of employment, the advance was conceded.

The miners of the Shenango Valley are now paid on a basis of 70 cents per ton, while the Mahoning Valley miners are being paid on a basis of 65 cents per ton.

Quite a riot was stirred up at the Columbia and Liberty furnaces in Virginia last week by reason of the substitution of colored for white labor at the furnaces. These works have heretofore been almost entirely run by white operatives, who live and own their little homes in the neighborhood of the furnaces, and have no other means of support than their daily labor, while the negroes, who are replacing them, are imported from other counties where the negro element prevails to a greater extent than in Shenandoah. The military was called out, but the rioters proved too much for them. The difficulty was settled by the discharge of the negroes.

A strike of about 100 molders employed at the Reading Hardware Works took place January 29. The cause assigned by the men is that, for some time past, the firm have been running but one cupola for blasting purposes, which caused the molders to work until seven o'clock every evening, whereas by running two cupolas the men claim they could finish the same amount of work by 5.30. The men applied to have this done, but their demands were not complied with, and as a result they quit their work in a body. Another complaint by the men is that, under the present arrangement, they were compelled to carry the iron used for molding a long distance. Only a short time since this same firm were subjected to a strike from their men on account of wages, which only ended after the molders had carried their point. The trouble has terminated by the proprietors granting the demand of the molders. They will resume work to-morrow morning.

The molders employed at the stove works of Orr, Painter & Co., Reading, have struck for higher wages.

The stove and machine molders of Pittsburgh, to the number of over 1000, are on a strike for an advance. The few remaining at work are non-union men, with the exception of those employed by two firms which have acceded to the demand. The machine molders demand an advance of 10 per cent., and the stove molders ask a return to the old card rates. The machine foundries are extremely busy at this time, while the busy season with the stove manufacturers is about over. These molders belong to the same union, one of the first established in this city.

The Mount Hickory Furnace, at Sharpsville, Pa., has been put upon a mixture of anthracite coal and coke, and it is reported that the working of the furnace has been fully up to the standard. In view of the great favor with which coke is regarded at anthracite furnaces, and the increased consumption of coke at these furnaces, this is a little out of the ordinary course. The cause is the threatened strike of the block coal miners in the Shenango Valley. These furnaces have been run on a mixture of block coal and coke, and anthracite has been substituted for block.

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Bainbridge Saw Works, Bainbridge, N.Y.	
Camp Saw Works, Camp, Wis.	
Case Saw Works, Case, Wis.	
Chapman Saw Works, Chapman, Wis.	
Dodge Saw Works, Dodge, Wis.	
Foster Saw Works, Foster, Wis.	
Gilbert Saw Works, Gilbert, Wis.	
Hartman Saw Works, Hartman, Wis.	
Jones Saw Works, Jones, Wis.	
Kelly Saw Works, Kelly, Wis.	
Lewis Saw Works, Lewis, Wis.	
Mason Saw Works, Mason, Wis.	
Nichols Saw Works, Nichols, Wis.	
Parker Saw Works, Parker, Wis.	
Ryan Saw Works, Ryan, Wis.	
Sawyer Saw Works, Sawyer, Wis.	
Shaw Saw Works, Shaw, Wis.	
Smith Saw Works, Smith, Wis.	
Taylor Saw Works, Taylor, Wis.	
Thompson Saw Works, Thompson, Wis.	
Wells Saw Works, Wells, Wis.	
White Saw Works, White, Wis.	
Wilson Saw Works, Wilson, Wis.	
Yates Saw Works, Yates, Wis.	

Wires, Makers of.	
American Saw Co., Trenton, N. J.	38
Boynton E. M., & Beckman, N. Y.	42
Bushnell & Sons, Buffalo, N. Y.	42
Gerlach Peter & Co., Cleveland, Ohio.	42
Queen City Cabinet Co., Cincinnati Ohio.	42
Wheeler, Madden & Clemens Mfg. Co., Towb, N. Y.	38
Saws, Scroll.	
Wheeler, Machine Co., Wilmington, Del.	33
Scales, Manufacturers of.	
Arnold & Rowe, Lansingburg, N. Y.	52
Bullard Scale Co., Buffalo, N. Y.	52
Charlton John & Sons, or Cliff, N. Y.	52
Hove Scale Co., Rutland, Vt.	26
Wheeler, 40th above Master, Phila.	26
Screws, Makers of.	
Miles F. S., 25 Quarry, Phila.	38
Thompson & Scher Co., Philadelphia, Pa.	38
Screw Cutting Machinery.	
Wiley & Russell Mfg. Co., Greenfield, Mass.	15
Screw Drivers, (Improved) Makers of	
Discher, Taylor & Sons, Phila.	20
Scythes.	
Beardsley Scythe Co., West Wasted, Conn.	16
Saddle Riders.	
Emmons Geo. E., West Morris, Conn.	16
Price A. F., East Haverhill, N. H.	16
Thompson & W. Whiting, N. Y.	16
Foranah R. C. & Co., Manchester, N. H.	16
Shaffing, Makers of.	
Burke, H. B., Allentown, Pa.	24
Sellers Wm. & Co., Phila. and 73 Liberty st., N. Y.	24
Shanks A. H., 12 Warren, N. Y.	10
Shoes, &c.	
Sparks Thos. W., 121 Walnut, Philadelphia.	25
Shovels, Spades and Sconps.	
Bushnell Shovel Co., St. Louis, Mo.	42
Husse, Hinn & Co., Pittsburgh, Pa.	12
Shutters, Steel and Wood.	
Clark & Co., W. 27th, N. Y.	8
Smelting Works.	
Philadelphia Smelting Co., 12th and Noble sts., Philadelphia.	16
Reeves Paul S., 750 South Broad, Phila.	16
Snaths.	
Great Snath Co., Springfield, Vt.	20
Spunking Tubes.	
Stratner W. R., to Ann N. Y.	38
Spindles.	
Mann & Spuler, 15 Liberty, N. Y.	38
Osgood F. & Co., Bergen Port, N. J.	54
Spigolstein.	
Wright Peter & Sons, Broadway, N. Y.	54
Spoons.	
Rogers Wm. & Son, Hartford, Ct.	11
Cary & Moon, 234 W. 20th, N. Y.	38
Gutler Steel Co., Ltd., Johnstown, Pa.	38 1/2
Howland & Harvey, Frankford, Phila.	42
Steam Boilers.	
Rabeok & Wilcox, 30 Cortlandt, N. Y.	40
Barber, H. B. & Bro., Allentown, Pa.	24
Hammer, & Co., Philadelphia, Pa.	24
Dienelt, Eisenhardt & Co., Philadelphia, Pa.	24
Dudgeon Richard, 24 Columbia, N. Y.	9
Steam Pumps, Manufacturers of.	
Cameron A. S., East 23d, N. Y.	40
Chrysler Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y.	40
Crane Bros. Mfg. Co., Chicago, Ill.	38 1/2
Conly Wm. E., 20 Cortlandt, N. Y.	40
Megowan John H. & Co., Cincinnati, O.	40
Storey W. W., 12 N. 10, Philadelphia.	40
Whitaker & Sons, New York, or New York, Ct.	40
Steel Castings, Manufacturers of.	
Chester Steel Castings Co., Evelina, Phila.	39
Eurens Cast Steel Co., Philadelphia, Pa.	39
Flager Stanley G. & Co., 216 and 218 N. 3d, Phila.	39
Pittsburgh Steel Casting Co., Pittsburgh, Pa.	39
Read & Co., Limited, Pittsburgh, Pa.	39
Steel Importers.	
Bar J. & Riley, 52 John, N. Y.	54
Hoback, John, N. York, N. Y.	54
McCoy & Co., 134 and 135 Duane, N. Y.	54
Wolfe, Kalin & Co., 26 Broadway, N. Y.	54
Steel Masher's Special.	
Handley Jones & Oliver, Boston, Mass.	54
Steel Manufacturers.	
Albany & Rensselaer Iron & Steel Co., Troy, N. Y.	54
The Benjamin Co., 211 Nassau, N. Y.	54
Cleveland Rolling Mill Co., Cleveland, O.	54
Cocker Brothers, Sheffield, Eng.	54
Deere City Steel Co., Cleveland, O.	54
Gautier Steel Co., Ltd., Johnstown, Pa.	54
Midvale Steel Works, Nicetown, Phila., Pa.	54
Miller Self, 100 Cortlandt, N. Y.	54
Pennsylvania Steel Co., 228 S. 4th, Phila.	54
Rowland Wm. & Harvey, Frankford, Phila.	54
Sanderson Geo. & Co., 100 Cortlandt, N. Y.	54
Smith, Sutton & Co., Pittsburgh, Pa.	54
Singer, Nimick & Co., Pittsburgh, Pa.	54
Stanger J. B. & Sons, Sheffield, Eng.	54
Standard Steel Works, Philadelphia, Pa.	54
The Edgar Thomson Steel Co., S. Broadway, N. Y.	54
The Steel Co. of England, N. Y.	54
Wardlaw S. & C., Sheffield, England.	54
Steel.	
Bauer & Co., 65 Greenwich Ave., N. Y.	14
Steel Spiral Springs, Manufacturers of.	
Chaffin & Sons, 100 Cortlandt, N. Y.	14
Chaillou John & Sons, 91 and 93 Cliff, N. Y.	14
Stocks and Dies.	
Stroyd & Co., Watford, N. Y.	53
Wiley & Russell Mfg. Co., Greenfield, Mass.	15
Stove Hoops, Manufacturers of.	
Ansonia Brass and Copper Co., 19 and 21 Cliff, N. Y.	9
Sugar Trucks.	
Thompson T. M. Mfg. Co., Indianapolis, Ind.	15
Sugar Bucket and Hanger.	
Foranah R. C., Burlington, Vt.	16
Tacks.	
American Tack Co., Fairhaven, Mass.	38
Dunbar, Hobart & Whidden 39 Warren, N. Y.	38
Field A. & Sons, Taunton, N. Y.	38
Grundey Geo. C., 16 Greenwich N. Y.	38
Melton, B. & Co., Birmingham, Ct.	38
Taps and Dies.	
Carpenter J. M., Pawtucket, R. I.	42
Manning & Sons, 100 Cortlandt, N. Y.	42
Wiley & Russell Mfg. Co., Greenfield, Mass.	15
Tin Plate, Importers of.	
U. S. Iron and Tin Plate Co., Pittsburgh, Pa.	15
Tin Plate, Manufacturers of.	
Merchant & Co., Philadelphia, Pa.	15
Monitor Tin Plate Works, 54 Cliff, N. Y.	15
U. S. Iron and Tin Plate Co., Pittsburgh, Pa.	15
Tin Ware, Stamped and Japanned.	
Block Div. H. B. & Bro., Allentown, Pa.	24
Schubert, H. B. & Bro., Allentown, Pa.	24
Huberman F., 251 Pearl, N. Y.	24
Shepard Sidney &	
Butler Jr., H. V. & C., 34 Reade, N. Y.	15
Toe Clarks.	
Ives, Woodruff & Co., Mount Carmel, Conn.	15
Tools, Railroad and Mining.	
McIntaf, Paul & Co., Pittsburgh, Pa.	20
Smith, Street & Co., N. York, N. Y.	20
Saunders Sons, Yonkers, N. Y.	20
Trawels.	
Bruce Geo. W., 1 Platt, New York	38
Try Squares, Levels, &c., Makers of.	
Disston Henry & Sons, Phila., Pa.	12
Tube Exports.	
Dudgeon Richard, 24 Columbia, N. Y.	9
Turner & Sons.	
Merchant & Co., 207 Market, Phila.	31
Twist Drills, Makers of.	
More Twist Drill Mach. Co., N. Bedford, Mass.	8
Upholsters, Ironers.	
Turner & Seymour Mfg. Co., 81 Reade, N. Y.	24
Valves, Gns., Water and Steam.	
Consolidated Valve Co., Boston, Mass.	49
Valve Ludge Mfg. Co., Troy, N. Y.	49
Polson & Hudson Mfg. Co., Watford, N. Y.	16
Varnish.	
Berry Brothers, Detroit, Mich.	7
W.	
Millers Falls Co., 74 Chambers, N. Y.	11
Water Wheels.	
Barber, H. B. & Bro., Allentown, Pa.	24
West Reading Pipe and Mach. Works, Reading, Pa.	15
Wheels, Railroad.	
Whitaker & Sons, Philadelphia.	40
White Lead.	
Pittsburgh White Lead Co., 50 Maiden Lane N. Y.	38
Colgate's House & Co., 65 Pearl, N. Y.	38
Jewett John & Sons, 182 Front, N. Y.	38
John T. & Bros., 231 S. Front, Phila., Pa.	16
Window, Glazing.	
Hammann Robt. B., Wethersfield, Conn.	38
Wires, Manufacturers of.	
Hammann & Co., Wethersfield, Conn.	38
Cleveland Rolling Mill Co., Cleveland, Ohio.	54
Felton & Guillemau, Carlsruhe, Germany.	38
Wheeler, 40th above Master, Phila.	26
Gilbert & Bennett Mfg. Co., 273 Pearl, N. Y.	38 1/2
Griawold J. Wool, Troy, N. Y.	38
Howard & Morn, 45 Fulton, N. Y.	38
Prestins Geo. W. & Co., Holyoke, Mass.	38
Polson & Hudson Mfg. Co., Watford, N. Y.	16
Washburn & Moen Mfg. Co., Worcester, Mass.	38
Wire Goods, Manufacturers of.	
Gilbert & Bennett Mfg. Co., 273 Pearl, N. Y.	38 1/2
Tate & Co., Boston, Mass.	11
Wire.	
American Wire Nail Co., Covington, Ky.	38
Dunbar, Hobart & Whidden 39 Warren, N. Y.	38
H. P. Nail Co., Cleveland, Ohio.	54
Wire Rope, Iron and Steel, Makers of.	
Barlow, H. B. & Bro., Allentown, Pa.	24
Hazard Mfg. Co., Wilkesbarre, Pa.	38
Reeshlin's John A. Sons, Trenton, N. J.	38
Bemis & Call Hdw. & Tool Co., Springfield, Mass 23 1/2	
Cox A. G. & Co., Worcester, Mass.	38
Conley & Sons, 100 Cortlandt, N. Y.	42
Grand Wrench Mfg. Co., Girard, Pa.	42
Wardlaw S. & C., Sheffield, Eng.	54
Wood Working Machinery.	
Foranah, S. C. & Co., Manchester, N. H.	16
W.	
Alexander T. J., Boston, Mass.	38
Metropolitan Washing Machine Co., 39 Cortlandt, N. Y.	38
Peerless Writner Co., Cincinnati, O.	38

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Decoctions, Infusions, Syrups, &c.



Enterprise Combination Fruit Press.
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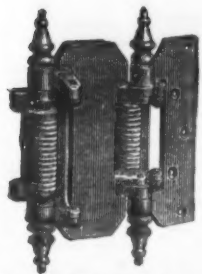
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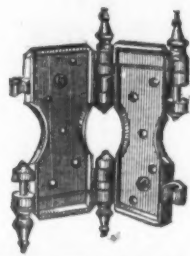
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Enterprise Patent Cold Handle Double Pointed
SMOOTHING & POLISHING IRONS
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PATENT MEASURING FAUCETS,
SELF-WEIGHING CHEESE KNIVES,
&c, &c.

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DOUBLE ACTING BUTT.



DOUBLE ACTING BLANK.

Exert their greatest force when door is closed.

*Air Cushion Door Springs,
Bullard's Patent Carpet Stretchers,
Jewett's Patent Spring Gate Hinges,
Cast Steel Mincing Knives, Hammered,
Tack Hammers and Claws,
Forged Cast Steel Screw Drivers, all varieties,
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Carpenters' Auls, Cleavers, Cake Turners,
Box Scrapers,
Wagon Jacks.*

THE COWLES HARDWARE COMPANY,

Unionville, Conn., U. S. A.,

Manufacturers of Household Hardware and Geer's Double and Single Acting Spring Butts, Reverse in Principle.

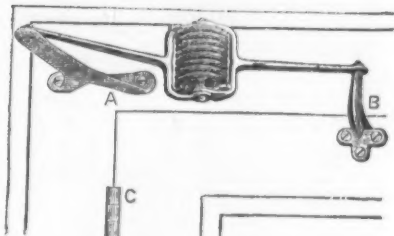
Read the following Points of Superiority:

1. They give, by actual test, 90 per cent. more power at closing point than at right angle, and the pressure is withdrawn 50 per cent. in swinging the door from closing point 14 inches, and grows gradually less till a point past the right angle is reached, where the action of the spring ceases altogether and the door remains at rest.
2. From this point the spring works equally well in either direction, and if the door is opened backward it is firmly retained against the wall.
3. It is impossible to strain the spring, as there is not more than 40 per cent. of its elasticity used in swinging the door back to the wall; therefore it never becomes weak from constant use.
4. Between the bearing joints are placed hardened steel washers, which are much superior to common cast iron or brass, both in regard to friction and durability.
5. They will not allow the door to sag.
6. No rights or lefts. Spring power adapted for either summer or winter without change. Are the only Spring Butts that will by actual test perform the labor claimed for them.

BLANK BUTTS.

We are pleased to offer in addition to our line a Blank Butt, designed to be used in combination with our Spring Butts on inside doors of Dwelling Houses, Hotels, Restaurants or in any position where the doors are not subject to strong currents of air. With our New Blank Butts we furnish for inside doors the most effective as well as the cheapest Spring Butt in market.

Send for descriptive circular, with price lists and Testimonials. Mention this paper.



HERCULES

Reverse Action Door
Spring & Retainer.

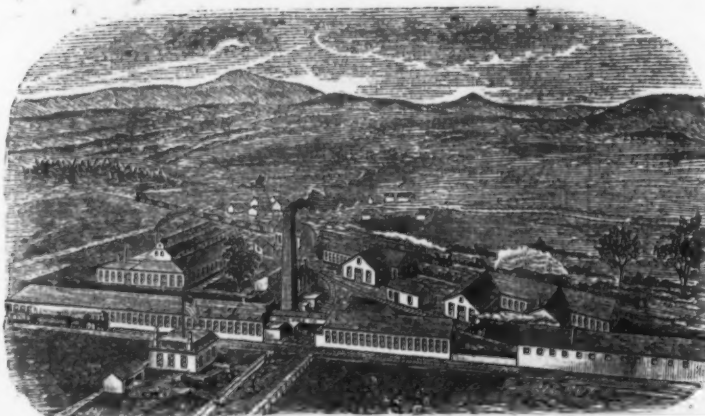
New principle, distinct from all others. Holds the door open as well as shut. Exerts its greatest force at the closing point. The best Spring in market.

THE IMPROVED HOWE SCALES.

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Works at Rutland, Vt.

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The highest Awards have invariably been given the Improved Howe Scales wherever exhibited in competition with other makes.

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Front View.

THE HORTON CAR WHEEL CHUCK.

This Chuck can be attached to a boring machine table, or lathe, and will hold a car wheel 37 inches in diameter and less. The jaws are made long to fit both tread and flange of car wheels, thus truing them both ways. For general machine work it is very useful, and will hold firmly any work that can be held in a Chuck.

THE E. HORTON & SON CO.,

MANUFACTURERS OF

THE HORTON

LATHE CHUCK

Windsor Locks, Conn., U. S. A.



Back View.

THE HORTON CAR WHEEL CHUCK.

This cut represents the Horton Car Wheel Chuck holding a car wheel in proper position for boring, the flange and tread of the wheel assuming a true position on the jaws. For accuracy and ease of operation this Chuck has no equal.

THE HARTFORD MACHINE SCREW CO.,

MANUFACTURERS OF

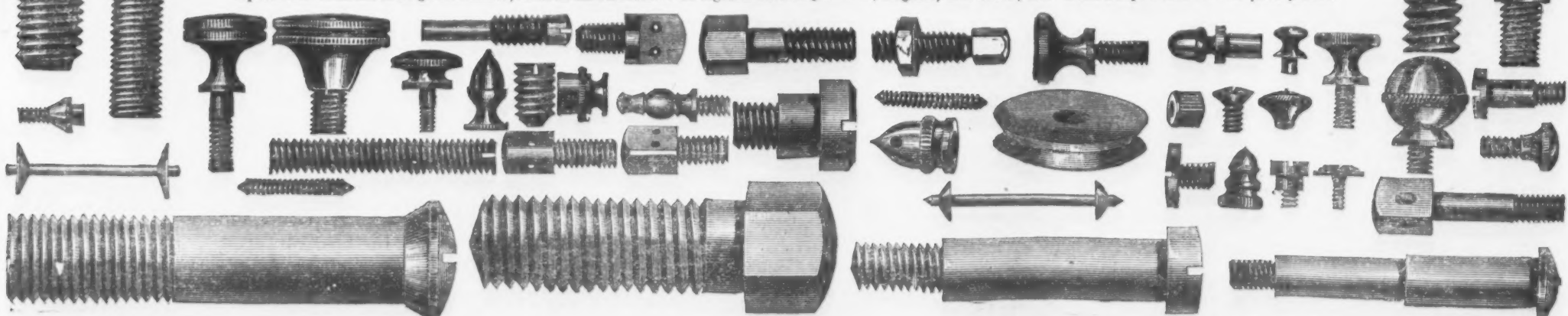
Hexagon Head Cap Screws, Round Head Set and Cap Screws, Square Head Set and Cap Screws, Sewing Machine Bobbins, Gem Screws, Agraffes, Studs and other Articles turned from Steel, Iron, or Brass by Automatic Machinery.

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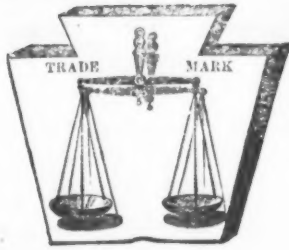
Special inducements to large consumers, such as manufacturers of Agricultural Implements, Engines, Mill Work, &c. Send samples and we will quote prices.

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HENRY DISSTON & SONS

KEYSTONE SAW, TOOL,



STEEL and FILE WORKS,

FRONT AND LAUREL STS., Philadelphia.

BRANCH WORKS: Tacony, Pa.; Chicago, Ill.

We desire to call attention to the improvement in putting up our goods, substituting boxes for paper covering. This will prove a great advantage to the dealer, saving the time consumed in untying and tying, also keeping them in better condition.

The new style Box here shown is our latest. We have been putting up the No. 76 D-8 and No. 120 Saws in boxes containing one-third of a dozen.



We have decided to put up all the saws marked "Disston" in this manner. The boxes will contain 1/2 dozen, and be assorted as follows: 1/2, 3/4, 1, 1 1/4, 1 1/2, 1 3/4, 2, 2 1/4, 2 1/2, 2 3/4, 3, 3 1/4, 3 1/2, 3 3/4, 4, 4 1/4, 4 1/2, 4 3/4, 5, 5 1/4, 5 1/2, 5 3/4, 6, 6 1/4, 6 1/2, 6 3/4, 7, 7 1/4, 7 1/2, 7 3/4, 8, 8 1/4, 8 1/2, 8 3/4, 9, 9 1/4, 9 1/2, 9 3/4, 10, 10 1/4, 10 1/2, 10 3/4, 11, 11 1/4, 11 1/2, 11 3/4, 12, 12 1/4, 12 1/2, 12 3/4, 13, 13 1/4, 13 1/2, 13 3/4, 14, 14 1/4, 14 1/2, 14 3/4, 15, 15 1/4, 15 1/2, 15 3/4, 16, 16 1/4, 16 1/2, 16 3/4, 17, 17 1/4, 17 1/2, 17 3/4, 18, 18 1/4, 18 1/2, 18 3/4, 19, 19 1/4, 19 1/2, 19 3/4, 20, 20 1/4, 20 1/2, 20 3/4, 21, 21 1/4, 21 1/2, 21 3/4, 22, 22 1/4, 22 1/2, 22 3/4, 23, 23 1/4, 23 1/2, 23 3/4, 24, 24 1/4, 24 1/2, 24 3/4, 25, 25 1/4, 25 1/2, 25 3/4, 26, 26 1/4, 26 1/2, 26 3/4, 27, 27 1/4, 27 1/2, 27 3/4, 28, 28 1/4, 28 1/2, 28 3/4, 29, 29 1/4, 29 1/2, 29 3/4, 30, 30 1/4, 30 1/2, 30 3/4, 31, 31 1/4, 31 1/2, 31 3/4, 32, 32 1/4, 32 1/2, 32 3/4, 33, 33 1/4, 33 1/2, 33 3/4, 34, 34 1/4, 34 1/2, 34 3/4, 35, 35 1/4, 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1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

Imitation Emerson.....	doz \$2.75, dis 40%	5
Trout's.....	doz \$2.75, dis 40%	5
Chapman.....	doz \$2.75, dis 40%	5
Seander's.....	doz \$2.75, dis 40%	5
Torrey's.....	doz \$2.75, dis 40%	5
stivets.....	doz \$2.75, dis 40%	5
Iron and Tinned.....	doz \$2.75, dis 40%	5
Copper Rivets and Burs.....	doz \$2.75, dis 40%	5
Stair.....	doz \$2.75, dis 40%	5
Tinned Iron Belt Rivets and Burs.....	doz \$2.75, dis 40%	5
Rods.....	doz \$2.75, dis 40%	5
Stair.....	doz \$2.75, dis 40%	5
American Patent.....	doz \$2.75, dis 40%	5
Rollers.....	doz \$2.75, dis 40%	5
Bar Door, Sargent's list.....	doz \$2.75, dis 40%	5
Novelty.....	doz \$2.75, dis 40%	5
Acme (Anti-Friction).....	doz \$2.75, dis 40%	5
Keeps.....	doz \$2.75, dis 40%	5
Manufacturers.....	doz \$2.75, dis 40%	5
Boxwood.....	doz \$2.75, dis 40%	5
Ivory.....	doz \$2.75, dis 40%	5
Standard.....	doz \$2.75, dis 40%	5
Stanley.....	doz \$2.75, dis 40%	5
Stephens.....	doz \$2.75, dis 40%	5
Willis Threlk & Son.....	doz \$2.75, dis 40%	5
From 1 to 10 lbs.....	doz \$2.75, dis 40%	5
Self Heating.....	doz \$2.75, dis 40%	5
Gleason's Shield and Toilet.....	doz \$2.75, dis 40%	5
Enterprise Patent Cold Handle.....	doz \$2.75, dis 40%	5
Mrs. Pot's Pat. Cold Handle.....	doz \$2.75, dis 40%	5
Combined Fluter and Bad Iron.....	doz \$2.75, dis 40%	5
Hand Paper.....	doz \$2.75, dis 40%	5
Badger & Anderson's Flint, 10 to 12.....	doz \$2.75, dis 40%	5
Assorted.....	doz \$2.75, dis 40%	5
Star.....	doz \$2.75, dis 40%	5
Emerald.....	doz \$2.75, dis 40%	5
New England, same list as B. & A. Flint.....	doz \$2.75, dis 40%	5
Gase's.....	doz \$2.75, dis 40%	5
Shah Cord.....	doz \$2.75, dis 40%	5
Common.....	doz \$2.75, dis 40%	5
Patent.....	doz \$2.75, dis 40%	5
Silver Lake.....	doz \$2.75, dis 40%	5
White Cotton.....	doz \$2.75, dis 40%	5
Drab Cotton.....	doz \$2.75, dis 40%	5
Raw Hide.....	doz \$2.75, dis 40%	5
Steel Ribbon.....	doz \$2.75, dis 40%	5
Shah Locks.....	doz \$2.75, dis 40%	5
Clark's, No. 1, \$1.00; No. 2, \$1.00 per gross.....	doz \$2.75, dis 40%	5
Forster's.....	doz \$2.75, dis 40%	5
Walker's.....	doz \$2.75, dis 40%	5
Hammond's Window Springs.....	doz \$2.75, dis 40%	5
Norham Window Springs.....	doz \$2.75, dis 40%	5
The Perfect, Clark & Smith, Plain Jap'd.....	doz \$2.75, dis 40%	5
For Knob Jap'd.....	doz \$2.75, dis 40%	5
Nickel-Plated.....	doz \$2.75, dis 40%	5
Shah Weights—Solid Eyes.....	doz \$2.75, dis 40%	5
Managers Stuffers or Filters.....	doz \$2.75, dis 40%	5
Miles.....	doz \$2.75, dis 40%	5
Perry.....	doz \$2.75, dis 40%	5
Pray Co. No. 4.....	doz \$2.75, dis 40%	5
Enterprise Mfg. Co.....	doz \$2.75, dis 40%	5
Silver.....	doz \$2.75, dis 40%	5
Diaston's Circular.....	doz \$2.75, dis 40%	5
Mill.....	doz \$2.75, dis 40%	5
Cross.....	doz \$2.75, dis 40%	5
Hand, Panel, Rib, &c.....	doz \$2.75, dis 40%	5
Boynton's Lightning, Cross Cuts, new list.....	doz \$2.75, dis 40%	5
One-Man, all lengths.....	doz \$2.75, dis 40%	5
Billet Web, 30 in.....	doz \$2.75, dis 40%	5
Lightning Buck Saw, 30 in.....	doz \$2.75, dis 40%	5
Lightning Hand, Panel and Rib.....	doz \$2.75, dis 40%	5
Wheeler & Clemson Mfg. Co.'s Hand.....	doz \$2.75, dis 40%	5
W. M. & C. Mfg. Co. Cross-Cuts, except Monarch.....	doz \$2.75, dis 40%	5
Livingston's Butcher and Kitchen.....	doz \$2.75, dis 40%	5
Framed Wood.....	doz \$2.75, dis 40%	5
Per doz.....	doz \$2.75, dis 40%	5
Faw Frames.....	doz \$2.75, dis 40%	5
White, Vermont.....	doz \$2.75, dis 40%	5
Red, Polished and Varished.....	doz \$2.75, dis 40%	5
Saw Rods.....	doz \$2.75, dis 40%	5
Saw Saws.....	doz \$2.75, dis 40%	5
Boynton's Patent X Cut, per doz.....	doz \$2.75, dis 40%	5
Hand Saw.....	doz \$2.75, dis 40%	5
Stillman's Genuine.....	doz \$2.75, dis 40%	5
Imitation.....	doz \$2.75, dis 40%	5
Common Lever.....	doz \$2.75, dis 40%	5
Leach's.....	doz \$2.75, dis 40%	5
Nash's.....	doz \$2.75, dis 40%	5
Bummers, Hotchkiss.....	doz \$2.75, dis 40%	5
Bent's & Co. No. 1 New Pat.....	doz \$2.75, dis 40%	5
Bent's & Co. No. 2 New Pat.....	doz \$2.75, dis 40%	5
Plate and Cross Cut.....	doz \$2.75, dis 40%	5
Allen's Genuine.....	doz \$2.75, dis 40%	5
Imitation.....	doz \$2.75, dis 40%	5
Part's Patent Lever.....	doz \$2.75, dis 40%	5
Diaston's.....	doz \$2.75, dis 40%	5
Scales.....	doz \$2.75, dis 40%	5
Patent Counter, No. 12.....	doz \$2.75, dis 40%	5
Tea, No. 12.....	doz \$2.75, dis 40%	5
Union Platform.....	doz \$2.75, dis 40%	5
Buffalo Scale Co.....	doz \$2.75, dis 40%	5
Rowe's.....	doz \$2.75, dis 40%	5
Hamilton's grocers.....	doz \$2.75, dis 40%	5
Eureka.....	doz \$2.75, dis 40%	5
Family Universal.....	doz \$2.75, dis 40%	5
Favorite.....	doz \$2.75, dis 40%	5
Turnbull's.....	doz \$2.75, dis 40%	5
Gene House, Chatham's list.....	doz \$2.75, dis 40%	5
Sargent's list.....	doz \$2.75, dis 40%	5
Adjustable Box Scraper (B. & L. Co.).....	doz \$2.75, dis 40%	5
Box, 1 Handle.....	doz \$2.75, dis 40%	5
Imitation.....	doz \$2.75, dis 40%	5
Defiance B. & Ship.....	doz \$2.75, dis 40%	5
Ship (common).....	doz \$2.75, dis 40%	5
Ship (common).....	doz \$2.75, dis 40%	5
Providence Tool Co.....	doz \$2.75, dis 40%	5
Screw Drivers.....	doz \$2.75, dis 40%	5
Douglas Mfg. Co.....	doz \$2.75, dis 40%	5
Diaston's.....	doz \$2.75, dis 40%	5
Diaston's Patent Excelsior.....	doz \$2.75, dis 40%	5
Buck Bros.....	doz \$2.75, dis 40%	5
Stanley Rule & Level Co., Varished Hds.....	doz \$2.75, dis 40%	5
Black Handlvs.....	doz \$2.75, dis 40%	5
Sargent & Co's.....	doz \$2.75, dis 40%	5
Flat H'd Iron.....	doz \$2.75, dis 40%	5
Round Head Iron.....	doz \$2.75, dis 40%	5
Flat Head Brass.....	doz \$2.75, dis 40%	5
Round Head Brass.....	doz \$2.75, dis 40%	5
Brass and Silver Capped.....	doz \$2.75, dis 40%	5
Japanned, list of "Main Screws".....	doz \$2.75, dis 40%	5
Lux or Common Copper.....	doz \$2.75, dis 40%	5
Cochan Patent Gimlet Point, list per 100.....	doz \$2.75, dis 40%	5
Test.....	doz \$2.75, dis 40%	5
Machine, Flat Head, Iron, Am. Screw Co.....	doz \$2.75, dis 40%	5
Round Head, Iron.....	doz \$2.75, dis 40%	5
Bench, Iron.....	doz \$2.75, dis 40%	5
Wood, Bench.....	doz \$2.75, dis 40%	5
Hickory.....	doz \$2.75, dis 40%	5
Hand Rail, Sargent's.....	doz \$2.75, dis 40%	5
Humason, Bailey & Co.....	doz \$2.75, dis 40%	5
Am. Screw Co.....	doz \$2.75, dis 40%	5
Jack (Wilson's).....	doz \$2.75, dis 40%	5
Screw Window Balances.....	doz \$2.75, dis 40%	5
H. B. Humason's, Single gro., \$2.34; 5 gro. \$2.58, dis 5%	doz \$2.75, dis 40%	5
Shears and Scissors.....	doz \$2.75, dis 40%	5
Cut Iron (American).....	doz \$2.75, dis 40%	5
Pruning.....	doz \$2.75, dis 40%	5
Harvard's Lamp Trimmers.....	doz \$2.75, dis 40%	5
Tinners'.....	doz \$2.75, dis 40%	5
Cast Steel, list, Nov. 25, 1879.....	doz \$2.75, dis 40%	5
Seymour's.....	doz \$2.75, dis 40%	5
Belcher's.....	doz \$2.75, dis 40%	5
Tailors' Shears.....	doz \$2.75, dis 40%	5
Shavers.....	doz \$2.75, dis 40%	5
Sliding Door, M. W. & Co. list.....	doz \$2.75, dis 40%	5
R. & E. list.....	doz \$2.75, dis 40%	5
Patent Roller.....	doz \$2.75, dis 40%	5
Patent Roller.....	doz \$2.75, dis 40%	5
Moore's Anti-Friction.....	doz \$2.75, dis 40%	5
Sliding Shutter, R. & E. list.....	doz \$2.75, dis 40%	5
Sargent's list.....	doz \$2.75, dis 40%	5
Moore's Anti-Friction (Hanging).....	doz \$2.75, dis 40%	5
Philadelphia Hangers.....	doz \$2.75, dis 40%	5
Shovels and Spades.....	doz \$2.75, dis 40%	5
Amos, New list, Jan. 26, 1880.....	doz \$2.75, dis 40%	5
Hussey Blinn & Co. Patent, New Pat.....	doz \$2.75, dis 40%	5
Association list.....	doz \$2.75, dis 40%	5
Old Colony (changes in list Oct. 15, 79).....	doz \$2.75, dis 40%	5
Remington's (Lawman's Patent).....	doz \$2.75, dis 40%	5
Dunning's Shovels and Scoops.....	doz \$2.75, dis 40%	5
Rowland's.....	doz \$2.75, dis 40%	5
Shovels and Tongs.....	doz \$2.75, dis 40%	5
Iron and Brass Head, R. & E. list.....	doz \$2.75, dis 40%	5
Polished Steel.....	doz \$2.75, dis 40%	5
States.....	doz \$2.75, dis 40%	5
Square Frame.....	doz \$2.75, dis 40%	5
Less than a case.....	doz \$2.75, dis 40%	5
Spoke Shaves.....	doz \$2.75, dis 40%	5
Defiance Metal.....	doz \$2.75, dis 40%	5
Wood.....	doz \$2.75, dis 40%	5
Baker's (Stanley & Co.) new list.....	doz \$2.75, dis 40%	5
Spoke Trimmers.....	doz \$2.75, dis 40%	5
Bonney's.....	doz \$2.75, dis 40%	5
Neary's.....	doz \$2.75, dis 40%	5
Ives.....	doz \$2.75, dis 40%	5
Douglas.....	doz \$2.75, dis 40%	5
Spoons.....	doz \$2.75, dis 40%	5
Pat. Thread Basting.....	doz \$2.75, dis 40%	5
Riveted Table and Tea.....	doz \$2.75, dis 40%	5
Solid Table and Tea.....	doz \$2.75, dis 40%	5
Britannia.....	doz \$2.75, dis 40%	5
Derby Silver Co.....	doz \$2.75, dis 40%	5
Boardman's Sons, A.....	doz \$2.75, dis 40%	5
R. Rogers & Son, A.....	doz \$2.75, dis 40%	5
Reed & Barton.....	doz \$2.75, dis 40%	5
Rail & Elton.....	doz \$2.75, dis 40%	5
Holmes, Booth & Harvill.....	doz \$2.75, dis 40%	5
German Silver.....	doz \$2.75, dis 40%	5
Cast Steel, all Plated.....	doz \$2.75, dis 40%	5

Tin (P. & W.) Teas.....	doz \$2.75, dis 40%	5
Tables.....	doz \$2.75, dis 40%	5
Tin Cowles Hdy. Co.....	doz \$2.75, dis 40%	5
Case lots.....	doz \$2.75, dis 40%	5
Stocks and Dies.....	doz \$2.75, dis 40%	5
"Lightning" Screw Plate.....	doz \$2.75, dis 40%	5
Stones.....	doz \$2.75, dis 40%	5
Indostan Stone.....	doz \$2.75, dis 40%	5
Slips.....	doz \$2.75, dis 40%	5
Sand Stone.....	doz \$2.75, dis 40%	5
Wasita Stone.....	doz \$2.75, dis 40%	5
No. 1, \$1.80 net.....	doz \$2.75, dis 40%	5
No. 2, \$1.50 net.....	doz \$2.75, dis 40%	5
No. 3, \$1.20 net.....	doz \$2.75, dis 40%	5
Wasita Stone (Boyd & Chase).....	doz \$2.75, dis 40%	5
mot'd (Boyd & Chase) 6, 7 & 8 in, dis 30%	doz \$2.75, dis 40%	5
Turkey Oil Stone (Boyd & Chase).....	doz \$2.75, dis 40%	5
Slips.....	doz \$2.75, dis 40%	5
Lake Superior (Boyd & Chase).....	doz \$2.75, dis 40%	5
Slips.....	doz \$2.75, dis 40%	5
Grindstones, Family, Loring's.....	doz \$2.75, dis 40%	5
Stove Polish.....	doz \$2.75, dis 40%	5
Joseph Dixon's.....	doz \$2.75, dis 40%	5
Gem.....	doz \$2.75, dis 40%	5
Gold Medal.....	doz \$2.75, dis 40%	5
Mirror.....	doz \$2.75, dis 40%	5
Ruby.....	doz \$2.75, dis 40%	5
Rising Sun.....	doz \$2.75, dis 40%	5
Dixon's Plumbage.....	doz \$2.75, dis 40%	5
Squares.....	doz \$2.75, dis 40%	5
Steel.....	doz \$2.75, dis 40%	5
full cases, dis 40%	doz \$2.75, dis 40%	5
Iron.....	doz \$2.75, dis 40%	5
full cases, dis 40%	doz \$2.75, dis 40%	5
Nickel Plated.....	doz \$2.75, dis 40%	5
Star Try Squares and Bevels.....	doz \$2.75, dis 40%	5
Diaston's Try Squares and T Bevels.....	doz \$2.75, dis 40%	5
Winterbottom's Try and Mitre.....	doz \$2.75, dis 40%	5
Tacks, Brads, &c.....	doz \$2.75, dis 40%	5
List of Oct. 31, 1879.....	doz \$2.75, dis 40%	5
Tinned Swedes Tacks.....	doz \$2.75, dis 40%	5
Tinned American.....	doz \$2.75, dis 40%	5
Swedes Tacks, all kinds.....	doz \$2.75, dis 40%	5
Copper Tacks and Nails.....	doz \$2.75, dis 40%	5
Swedes Hungarian Nails.....	doz \$2.75, dis 40%	5
American.....	doz \$2.75, dis 40%	5
Slips and Lace Tacks.....	doz \$2.75, dis 40%	5
Finishing Nails.....	doz \$2.75, dis 40%	5
Trunk and Clout Nails.....	doz \$2.75, dis 40%	5
Common and Patent Brads.....	doz \$2.75, dis 40%	5
Basket Nails.....	doz \$2.75, dis 40%	5
Brush Tacks.....	doz \$2.75, dis 40%	5
Leathered Carpet Tacks.....	doz \$2.75, dis 40%	5
American Cut Tacks.....	doz \$2.75, dis 40%	5
Cigar Box Nails.....	doz \$2.75, dis 40%	5
Chair Nails.....	doz \$2.75, dis 40%	5
All other Tack List goods.....	doz \$2.75, dis 40%	5
Double-Pointed Tacks.....	doz \$2.75, dis 40%	5
Tap Bore.....	doz \$2.75, dis 40%	5
Common and Ring.....	doz \$2.75, dis 40%	5
Ives' Tap Bore.....	doz \$2.75, dis 40%	5
Enterprise Mfg. Co.....	doz \$2.75, dis 40%	5
Tapes, Measuring.....	doz \$2.75, dis 40%	5
American.....	doz \$2.75, dis 40%	5
Spring Tapes.....	doz \$2.75, dis 40%	5
Thermometers.....	doz \$2.75, dis 40%	5
Tin Case.....	doz \$2.75, dis 40%	5
Tobacco Cutters.....	doz \$2.75, dis 40%	5
Enterprise Mfg. Co. (Champion).....	doz \$2.75, dis 40%	5
Wood Bottom.....	doz \$2.75, dis 40%	5
All Iron.....	doz \$2.75, dis 40%	5
Nashua Lock Co's.....	doz \$2.75, dis 40%	5
Toe Calks—Winsted.....	doz \$2.75, dis 40%	5
Tinners' Tools and Machines.....	doz \$2.75, dis 40%	5
Machines (P. & W.).....	doz \$2.75, dis 40%	5
Tools (P. & W.).....	doz \$2.75, dis 40%	5
Traps.....	doz \$2.75, dis 40%	5
Game, Newhouse.....	doz \$2.75, dis 40%	5
Newhouse Patent.....	doz \$2.75, dis 40%	5
Blake's Patent.....	doz \$2.75, dis 40%	5
Mouse, Wood, Choker.....	doz \$2.75, dis 40%	5
Round Wire.....	doz \$2.75, dis 40%	5
Cage.....	doz \$2.75, dis 40%	5
Catch-em-alive.....	doz \$2.75, dis 40%	5
Rat, "Decor".....	doz \$2.75, dis 40%	5
Trowels.....	doz \$2.75, dis 40%	5
Lothron's Brick and Plastering.....	doz \$2.75, dis 40%	5
Good's Brick and Plastering.....	doz \$2.75, dis 40%	5
Diaston's Brick and Plastering.....	doz \$2.75, dis 40%	5
Pease's Plastering.....	doz \$2.75, dis 40%	5
Clement & Maynard's.....	doz \$2.75, dis 40%	5
Rose's Brick.....	doz \$2.75, dis 40%	5
Grader's Brick.....	doz \$2.75, dis 40%	5
Worral's Brick and Plastering.....	doz \$2.75, dis 40%	5
Garden.....	doz \$2.75, dis 40%	5
Triers.....	doz \$2.75, dis 40%	5
Butter and Ch. se.....	doz \$2.75, dis 40%	5
Wires.....	doz \$2.75, dis 40%	5
List of July 1, 79.....	doz \$2.75, dis 40%	5
"Crown" (A. H. Hildick) 40 to 100 ft, 100 to 150 ft.....	doz \$2.75, dis 40%	5
Peter Wright's.....	doz \$2.75, dis 40%	5
Parallel, Parker's.....	doz \$2.75, dis 40%	5
"Howard's.....	doz \$2.75, dis 40%	5
Merrill's.....	doz \$2.75, dis 40%	5
Sargent's.....	doz \$2.75, dis 40%	5
Trenton.....	doz \$2.75, dis 40%	5
Backus and Union.....	doz \$2.75, dis 40%	5
Enterprise.....	doz \$2.75, dis 40%	5
Stevens'.....	doz \$2.75, dis 40%	5
Stimpen's Adjustable.....	doz \$2.75, dis 40%	5
"Family".....	doz \$2.75, dis 40%	5
Wm. Filers, Bonney's.....	doz \$2.75, dis 40%	5
"Sears".....	doz \$2.75, dis 40%	5
Lowell Hand Vises.....	doz \$2.75, dis 40%	5
Richardson's Vise and Level.....	doz \$2.75, dis 40%	5
Washers.....	doz \$2.75, dis 40%	5
Johnson's.....	doz \$2.75, dis 40%	5
Penny's.....	doz \$2.75, dis 40%	5
Washers—See Nuts and Washers.....	doz \$2.75, dis 40%	5
Wall Wheels—Revised list.....	doz \$2.75, dis 40%	5
Wire.....	doz \$2.75, dis 40%	5
Brass and Copper..... List of Jan. 1, 1880.....	doz \$2.75, dis 40%	5
Bright and Annealed.....	doz \$2.75, dis 40%	5
"Nos. 19 to 26, dis 31 to 37 1/2 %	doz \$2.75, dis 40%	5
"Nos. 27 to 30, dis 40 to 46 1/2 %	doz \$2.75, dis 40%	5
Galvanized.....	doz \$2.75, dis 40%	5
"Nos. 19 to 26, dis 31 to 37 1/2 %	doz \$2.75, dis 40%	5
"Nos. 27 to 30, dis 40 to 46 1/2 %	doz \$2.75, dis 40%	5
Tinned, Nos. 1 to 10.....	doz \$2.75, dis 40%	5
Cast Steel.....	doz \$2.75, dis 40%	5
Galvanized.....	doz \$2.75, dis 40%	5
Annealed Fence, 2 1/2, 3 and 4.....	doz \$2.75, dis 40%	5
Galvanized Telegraph, Nos. 7 to 10.....	doz \$2.75, dis 40%	5
"Nos. 11 to 14.....	doz \$2.75, dis 40%	5
Fence Staples.....	doz \$2.75, dis 40%	5
"Nos. 15 to 18.....	doz \$2.75, dis 40%	5
"Nos. 19 to 22.....	doz \$2.75, dis 40%	5
Steads, Galvanized.....	doz \$2.75, dis 40%	5
Steel Steel Wire.....	doz \$2.75, dis 40%	5
Galvanized.....	doz \$2.75, dis 40%	5
Steel Steel Wire, Nos. 12 to 27.....	doz \$2.75, dis 40%	5
Turner & Seymour Mfg. Co., Picture Wire.....	doz \$2.75, dis 40%	5
Judd's Picture Wire.....	doz \$2.75, dis 40%	5
Picture Line.....	doz \$2.75, dis 40%	5
Green Wire Cloth, per sq. foot.....	doz \$2.75, dis 40%	5
Wrenches.....	doz \$2.75, dis 40%	5
American Adjustable.....	doz \$2.75, dis 40%	5
"American Adjustable".....	doz \$2.75, dis 40%	5
"Diagonal.....	doz \$2.75, dis 40%	5
Cross "Grinding.....	doz \$2.75, dis 40%	5
"Mechanic.....	doz \$2.75, dis 40%	5
Pattern, Malleable.....	doz \$2.75, dis 40%	5
Girds Standard.....	doz \$2.75, dis 40%	5
David's.....	doz \$2.75, dis 40%	5
Patent Duplex.....	doz \$2.75, dis 40%	5
Bemis & Co's Patent Combination.....	doz \$2.75, dis 40%	5
"Merrick's Pattern.....	doz \$2.75, dis 40%	5
"Grinder or Sea Pipe.....	doz \$2.75, dis 40%	5
Van Wagoner & Williams' Earth.....	doz \$2.75, dis 40%	5
Aiken Pocket (Bills).....	doz \$2.75, dis 40%	5
The Favorite Pocket (prior to 1880).....	doz \$2.75, dis 40%	5
Webster's Pat. Combination.....	doz \$2.75, dis 40%	5
Winners.....	doz \$2.75, dis 40%	5
Peerless, No. 5, No. 6 Cog.....	doz \$2.75, dis 40%	5
"No. 2 1/2, with Cog.....	doz \$2.75, dis 40%	5
"No. 4.....	doz \$2.75, dis 40%	5
"No. 4.....	doz \$2.75, dis 40%	5
Unique, No. 5.....	doz \$2.75, dis 40%	5
Universal, XX No. 2 1/2.....	doz \$2.75, dis 40%	5
"No. 1.....	doz \$2.75, dis 40%	5
"No. 2.....	doz \$2.75, dis 40%	5
"No. 3.....	doz \$2.75, dis 40%	5
Crown No. 3.....	doz \$2.75, dis 40%	5
"No. 4.....	doz \$2.75, dis 40%	5
"No. 5.....	doz \$2.75, dis 40%	5
Novelty.....	doz \$2.75, dis 40%	5
"No. 1.....	doz \$2.75, dis 40%	5
Exterior, No. 4, with Folding Bench.....	doz \$2.75, dis 40%	5
"No. 5, for New List.....	doz \$2.75, dis 40%	5
Stamped Tinware—See List Jan. 1, 1880.....	doz \$2.75, dis 40%	5
Common Stamped Ware.....	doz \$2.75, dis 40%	5
Stamped Deep and Retinned Ware.....	doz \$2.75, dis 40%	5

ALWAYS ASK FOR

ESTERBROOK'S

THE MOST POPULAR PENS IN USE.

For Sale by all Stationers.

ESTERBROOK STEEFEN CO.,

Works, Camden, N. J. New York,

NEW YORK WHOLESALE PRICES, FEBRUARY 4, 1880.

METALS.

IRON.—DUTY: Bars, 1 to 140. Sheet, Band and Hoop and Scroll, 14 to 140. W. B. provided, that none of the above iron shall pay a less rate of duty than 35 per cent. Pig, 7 to 10; Polished Sheet, 30. W. B. Wrought Scrap, 40 to 100; Cast Scrap, 40 per ton. Railroad Rod, 20 to 25. Boiler and Plate, 140. W. B.

Pig Iron.—AMERICAN NOMINAL. Foundry No. 1, 1 to 10. 30.00 @ 41.00. No. 2, 1 to 10. 30.00 @ 39.00. Gray Forge, 1 to 10. 37.00 @ 38.00.

SCOTCH. Elliptical, 1 to 10. 32.00 @ 33.00. Coltness, 1 to 10. 34.00 @ 35.00. Glasgow, 1 to 10. 34.00 @ 35.00. Garscadden, 1 to 10. 33.00 @ 34.00.

Rails. Iron, 1 to 10. 34.00 @ 35.00. Steel, 1 to 10. 34.00 @ 35.00. Old Rail, 1 to 10. 43.00 @ 45.00.

Scrap. Wrought Scrap, from yard, 1 to 10. 45.00 @ 45.00.

Star Iron, from Store. Common Iron, 1 to 10. 34.00 @ 35.00. Refined Iron, 1 to 10. 34.00 @ 35.00.

Sheet Iron. Common American, 1 to 10. 34.00 @ 35.00. R. G. American, 1 to 10. 34.00 @ 35.00.

COPPER.—DUTY: Pig, Bar and Ingot, 1 to 10. 34.00 @ 35.00. Wrought Scrap, 1 to 10. 34.00 @ 35.00. American Ingot, 1 to 10. 34.00 @ 35.00.

BRASS.—DUTY: Pig, Bar and Ingot, 1 to 10. 34.00 @ 35.00. Wrought Scrap, 1 to 10. 34.00 @ 35.00. American Ingot, 1 to 10. 34.00 @ 35.00.

GERMAN SILVER TUBING.—dis 10 to 15. 100.00 @ 110.00. 15 to 20. 110.00 @ 120.00. 20 to 25. 120.00 @ 130.00. 25 to 30. 130.00 @ 140.00. 30 to 35. 140.00 @ 150.00. 35 to 40. 150.00 @ 160.00. 40 to 45. 160.00 @ 170.00. 45 to 50. 170.00 @ 180.00. 50 to 55. 180.00 @ 190.00. 55 to 60. 190.00 @ 200.00. 60 to 65. 200.00 @ 210.00. 65 to 70. 210.00 @ 220.00. 70 to 75. 220.00 @ 230.00. 75 to 80. 230.00 @ 240.00. 80 to 85. 240.00 @ 250.00. 85 to 90. 250.00 @ 260.00. 90 to 95. 260.00 @ 270.00. 95 to 100. 270.00 @ 280.00. 100 to 105. 280.00 @ 290.00. 105 to 110. 290.00 @ 300.00. 110 to 115. 300.00 @ 310.00. 115 to 120. 310.00 @ 320.00. 120 to 125. 320.00 @ 330.00. 125 to 130. 330.00 @ 340.00. 130 to 135. 340.00 @ 350.00. 135 to 140. 350.00 @ 360.00. 140 to 145. 360.00 @ 370.00. 145 to 150. 370.00 @ 380.00. 150 to 155. 380.00 @ 390.00. 155 to 160. 390.00 @ 400.00. 160 to 165. 400.00 @ 410.00. 165 to 170. 410.00 @ 420.00. 170 to 175. 420.00 @ 430.00. 175 to 180. 430.00 @ 440.00. 180 to 185. 440.00 @ 450.00. 185 to 190. 450.00 @ 460.00. 190 to 195. 460.00 @ 470.00. 195 to 200. 470.00 @ 480.00. 200 to 205. 480.00 @ 490.00. 205 to 210. 490.00 @ 500.00. 210 to 215. 500.00 @ 510.00. 215 to 220. 510.00 @ 520.00. 220 to 225. 520.00 @ 530.00. 225 to 230. 530.00 @ 540.00. 230 to 235. 540.00 @ 550.00. 235 to 240. 550.00 @ 560.00. 240 to 245. 560.00 @ 570.00. 245 to 250. 570.00 @ 580.00. 250 to 255. 580.00 @ 590.00. 255 to 260. 590.00 @ 600.00. 260 to 265. 600.00 @ 610.00. 265 to 270. 610.00 @ 620.00. 270 to 275. 620.00 @ 630.00. 275 to 280. 630.00 @ 640.00. 280 to 285. 640.00 @ 650.00. 285 to 290. 650.00 @ 660.00. 290 to 295. 660.00 @ 670.00. 295 to 300. 670.00 @ 680.00. 300 to 305. 680.00 @ 690.00. 305 to 310. 690.00 @ 700.00. 310 to 315. 700.00 @ 710.00. 315 to 320. 710.00 @ 720.00. 320 to 325. 720.00 @ 730.00. 325 to 330. 730.00 @ 740.00. 330 to 335. 740.00 @ 750.00. 335 to 340. 750.00 @ 760.00. 340 to 345. 760.00 @ 770.00. 345 to 350. 770.00 @ 780.00. 350 to 355. 780.00 @ 790.00. 355 to 360. 790.00 @ 800.00. 360 to 365. 800.00 @ 810.00. 365 to 370. 810.00 @ 820.00. 370 to 375. 820.00 @ 830.00. 375 to 380. 830.00 @ 840.00. 380 to 385. 840.00 @ 850.00. 385 to 390. 850.00 @ 860.00. 390 to 395. 860.00 @ 870.00. 395 to 400. 870.00 @ 880.00. 400 to 405. 880.00 @ 890.00. 405 to 410. 890.00 @ 900.00. 410 to 415. 900.00 @ 910.00. 415 to 420. 910.00 @ 920.00. 420 to 425. 920.00 @ 930.00. 425 to 430. 930.00 @ 940.00. 430 to 435. 940.00 @ 950.00. 435 to 440. 950.00 @ 960.00. 440 to 445. 960.00 @ 970.00. 445 to 450. 970.00 @ 980.00. 450 to 455. 980.00 @ 990.00. 455 to 460. 990.00 @ 1000.00. 460 to 465. 1000.00 @ 1010.00. 465 to 470. 1010.00 @ 1020.00. 470 to 475. 1020.00 @ 1030.00. 475 to 480. 1030.00 @ 1040.00. 480 to 485. 1040.00 @ 1050.00. 485 to 490. 1050.00 @ 1060.00. 490 to 495. 1060.00 @ 1070.00. 495 to 500. 1070.00 @ 1080.00. 500 to 505. 1080.00 @ 1090.00. 505 to 510. 1090.00 @ 1100.00. 510 to 515. 1100.00 @ 1110.00. 515 to 520. 1110.00 @ 1120.00. 520 to 525. 1120.00 @ 1130.00. 525 to 530. 1130.00 @ 1140.00. 530 to 535. 1140.00 @ 1150.00. 535 to 540. 1150.00 @ 1160.00. 540 to 545. 1160.00 @ 1170.00. 545 to 550. 1170.00 @ 1180.00. 550 to 555. 1180.00 @ 1190.00. 555 to 560. 1190.00 @ 1200.00. 560 to 565. 1200.00 @ 1210.00. 565 to 570. 1210.00 @ 1220.00. 570 to 575. 1220.00 @ 1230.00. 575 to 580. 1230.00 @ 1240.00. 580 to 585. 1240.00 @ 1250.00. 585 to 590. 1250.00 @ 1260.00. 590 to 595. 1260.00 @ 1270.00. 595 to 600. 1270.00 @ 1280.00. 600 to 605. 1280.00 @ 1290.00. 605 to 610. 1290.00 @ 1300.00. 610 to 615. 1300.00 @ 1310.00. 615 to 620. 1310.00 @ 1320.00. 620 to 625. 1320.00 @ 1330.00. 625 to 630. 1330.00 @ 1340.00. 630 to 635. 1340.00 @ 1350.00. 635 to 640. 1350.00 @ 1360.00. 640 to 645. 1360.00 @ 1370.00. 645 to 650. 1370.00 @ 1380.00. 650 to 655. 1380.00 @ 1390.00. 655 to 660. 1390.00 @ 1400.00. 660 to 665. 1400.00 @ 1410.00. 665 to 670. 1410.00 @ 1420.00. 670 to 675. 1420.00 @ 1430.00. 675 to 680. 1430.00 @ 1440.00. 680 to 685. 1440.00 @ 1450.00. 685 to 690. 1450.00 @ 1460.00. 690 to 695. 1460.00 @ 1470.00. 695 to 700. 1470.00 @ 1480.00. 700 to 705. 1480.00 @ 1490.00. 705 to 710. 1490.00 @ 1500.00. 710 to 715. 1500.00 @ 1510.00. 715 to 720. 1510.00 @ 1520.00. 720 to 725. 1520.00 @ 1530.00. 725 to 730. 1530.00 @ 1540.00. 730 to 735. 1540.00 @ 1550.00. 735 to 740. 1550.00 @ 1560.00. 740 to 745. 1560.00 @ 1570.00. 745 to 750. 1570.00 @ 1580.00. 750 to 755. 1580.00 @ 1590.00. 755 to 760. 1590.00 @ 1600.00. 760 to 765. 1600.00 @ 1610.00. 765 to 770. 1610.00 @ 1620.00. 770 to 775. 1620.00 @ 1630.00. 775 to 780. 1630.00 @ 1640.00. 780 to 785. 1640.00 @ 1650.00. 785 to 790. 1650.00 @ 1660.00. 790 to 795. 1660.00 @ 1670.00. 795 to 800. 1670.00 @ 1680.00. 800 to 805. 1680.00 @ 1690.00. 805 to 810. 1690.00 @ 1700.00. 810 to 815. 1700.00 @ 1710.00. 815 to 820. 1710.00 @ 1720.00. 820 to 825. 1720.00 @ 1730.00. 825 to 830. 1730.00 @ 1740.00. 830 to 835. 1740.00 @ 1750.00. 835 to 840. 1750.00 @ 1760.00. 840 to 845. 1760.00 @ 1770.00. 845 to 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2390.00 @ 2400.00. 1160 to 1165. 2400.00 @ 2410.00. 1165 to 1170. 2410.00 @ 2420.00. 1170 to 1175. 2420.00 @ 2430.00. 1175 to 1180. 2430.00 @ 2440.00. 1180 to 1185. 2440.00 @ 2450.00. 1185 to 1190. 2450.00 @ 2460.00. 1190 to 1195. 2460.00 @ 2470.00. 1195 to 1200. 2470.00 @ 2480.00. 1200 to 1205. 2480.00 @ 2490.00. 1205 to 1210. 2490.00 @ 2500.00. 1210 to 1215. 2500.00 @ 2510.00. 1215 to 1220. 2510.00 @ 2520.00. 1220 to 1225. 2520.00 @ 2530.00. 1225 to 1230. 2530.00 @ 2540.00. 1230 to 1235. 2540.00 @ 2550.00. 1235 to 1240. 2550.00 @ 2560.00. 1240 to 1245. 2560.00 @ 2570.00. 1245 to 1250. 2570.00 @ 2580.00. 1250 to 1255. 2580.00 @ 2590.00. 1255 to 1260. 2590.00 @ 2600.00. 1260 to 1265. 2600.00 @ 2610.00. 1265 to 1270. 2610.00 @ 2620.00. 1270 to 1275. 2620.00 @ 2630.00. 1275 to 1280. 2630.00 @ 2640.00. 1280 to 1285. 2640.00 @ 2650.00. 1285 to 1290. 2650.00 @ 2660.00. 1290 to 1295. 2660.00 @ 2670.00. 1295 to 1300. 2670.00 @ 2680.00. 1300 to 1305. 2680.00 @ 2690.00. 1305 to 1310. 2690.00 @ 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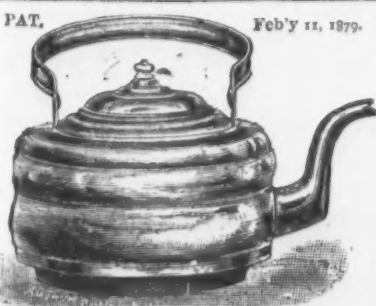
4th.—The Armstrong Dies being made in two parts instead of one (as in the solid Die), can be more perfectly constructed; the cutting edges reached more directly; the work done with greater precision and uniformity, by which they accomplish a much better result.

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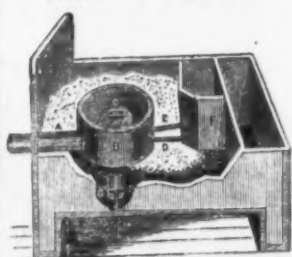
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This Tuyere can be placed in any Forge, with or without water. This Tuyere has been in use for the past ten years, has stood the test, and exceeds by far any made at the present time.

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A 30-inch Bellows. No. 4, is equal to a 40-inch pear-shaped Bellows, and a boy of 5 years can work them.

Copy of the Judges' Report in Department V, Group 3, at the 4th Exhibition of the American Institute, held in the City of New York, October, 1876. No. 661.—Blacksmith's Triple Action Cylindrical Bellows.

John Bayliss, No. 147 East 54th st., New York. That a comparison and an actual test of the above named bellows exhibited in the same group convinces your judges that for Blacksmith's use the bellows is not only far superior to the hand blowers exhibited and used to be used for the same purpose, but that it is superior also to bellows heretofore used. We regard it as a decided advance in the art, and unanimously recommend it for the highest award consistent with the rules adopted by your board for such exhibits.

Silver Medal Awarded.

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They are especially adapted for Railroads, Ship, Steam Boiler, Carriage, Bridge Building, Horse Shoers, Jewelers, Pipe Fitting and Locksmiths.

There are three sizes, the cut representing the smallest size.

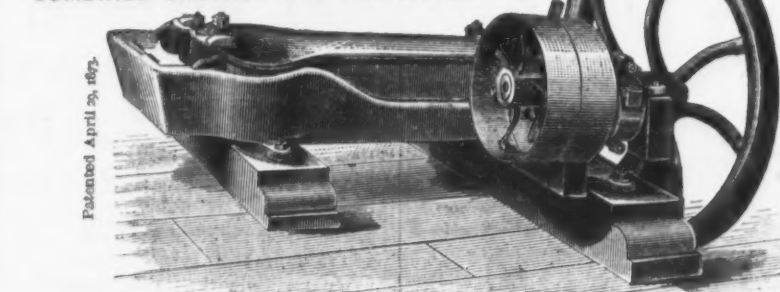
No. 2 will heat to a welding heat a 3/4 inch square bar in 12 minutes, and do any work up to 3/4 inches square iron equal to any forge of larger size.

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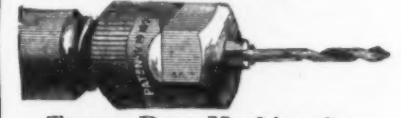
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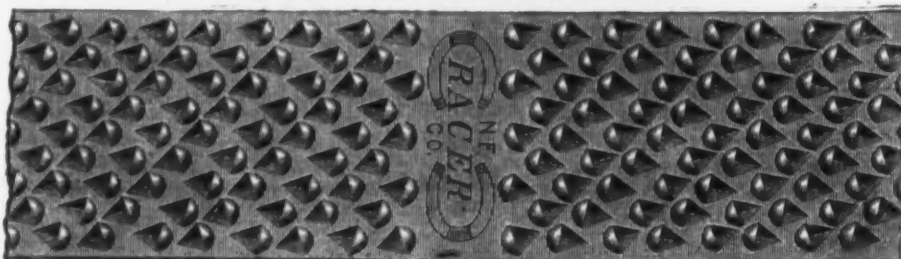
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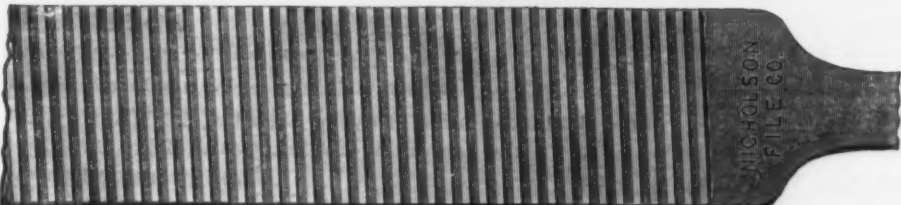
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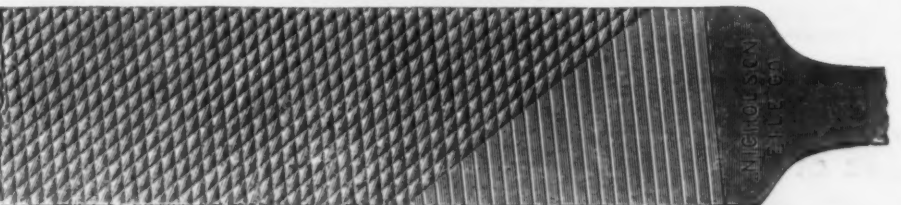
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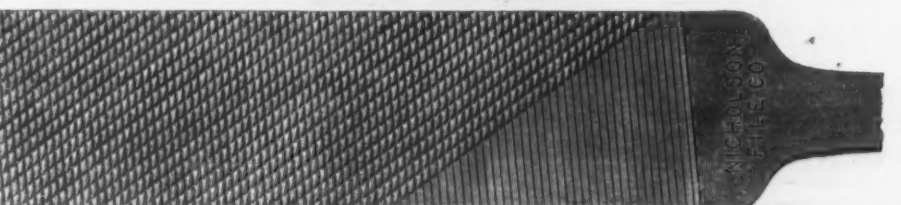
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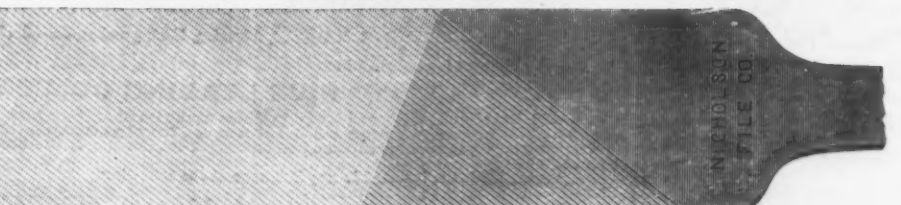
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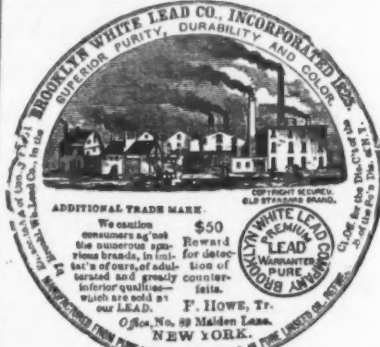


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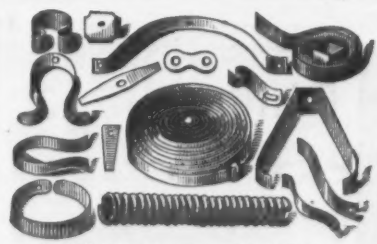
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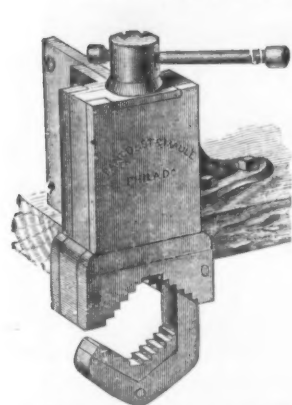
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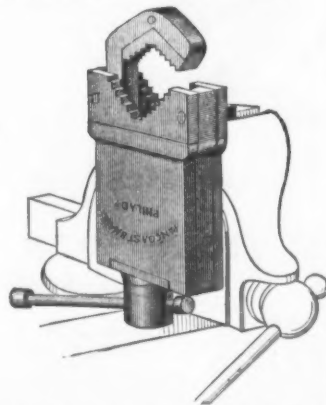
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Over 524288000 lbs.	110 net
Over 1048576000 lbs.	110 net
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Over 4194304000 lbs.	110 net
Over 8388608000 lbs.	110 net
Over 16777216000 lbs.	110 net
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Over 268435456000 lbs.	110 net
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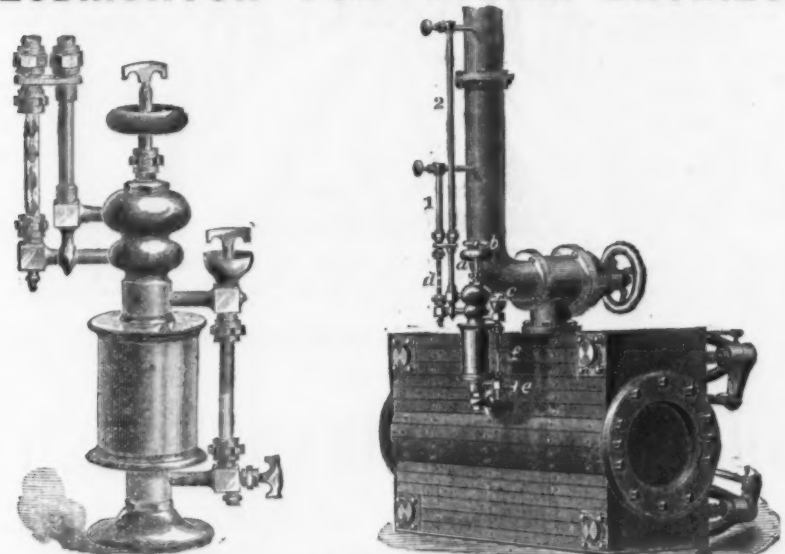
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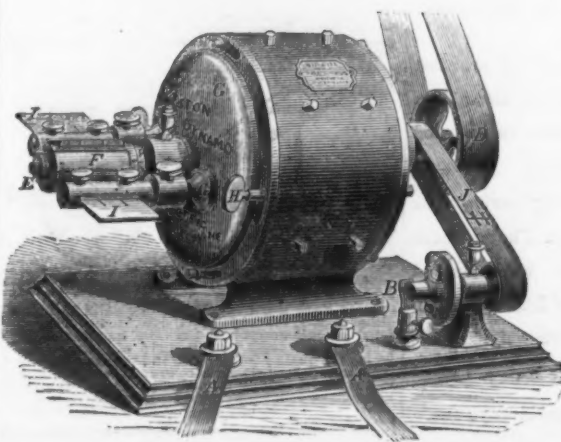
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PATENT EXTENSION,
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Patented in Great Britain
March 18, 1878.

We desire to call your attention to our NEW

PATENT EXTENSION DOOR KNOBS.

These we manufacture in every variety of style. Your especial attention is called to our "SILVER GLASS," and "ENAMELED" KNOBS, the latter being an entirely new article. These we offer to the Trade, feeling confident of their superiority to any other door knobs in the market. Our new method of extension is simple, durable and perfect.

Our Knobs can be adjusted to doors of any thickness without the annoyance of the old-fashioned washers and pins. We feel confident that a trial will make plain their merits.

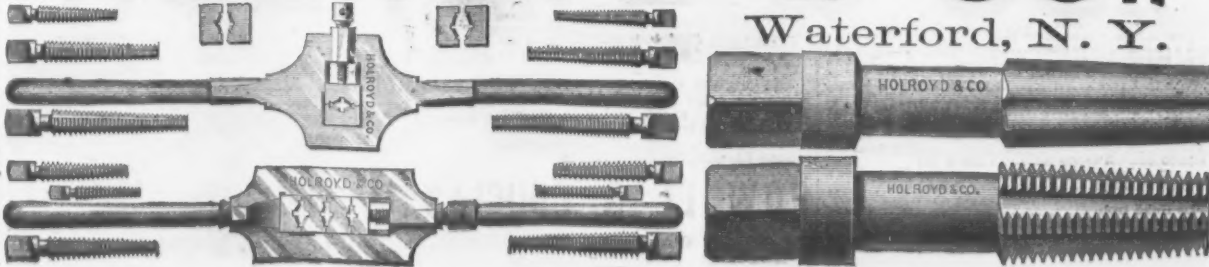
Very truly yours,

THE STAR SALT CASTER CO.,
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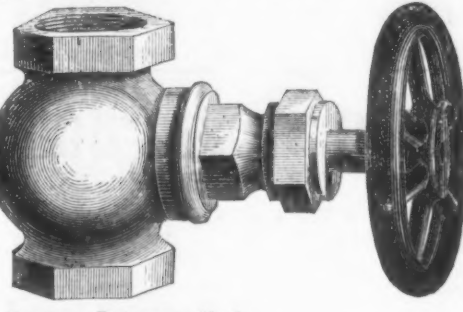


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McNab & Harlin Mfg. Co.,
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For STEAM,
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Iron Pipe and Fittings.
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New Illustrated Catalogue and Price
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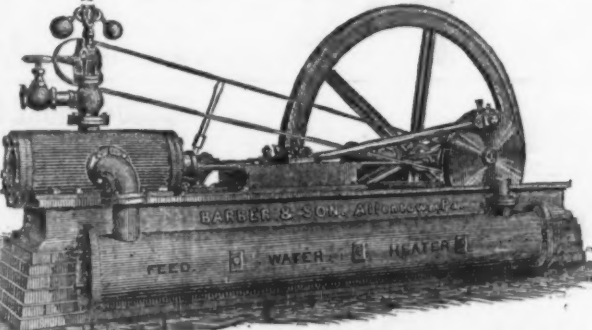


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Square & Hexagon Nuts,
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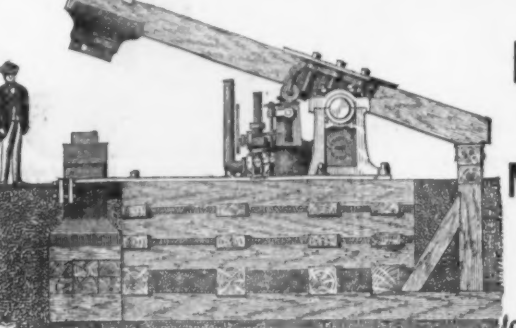



The Allentown Foundry and Machine Shops.
Established in 1835.
Old and reliable. Man-
ufacture Steam En-
gines, Double Hoist-
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Engines, Boilers of
any description,
Power Pumps, Flange
Pipes from 4 to 36 in. bore,
Thomas' patented and
Bradford's patent Ore
Washers, Min-
ing Machinery, Blast
Furnace Work, Hot Blast
Castings, Turbine
Wheels, Shafting
and Pulleys.
More than half of the Engines and Mining Machinery used in mining ores in the Lehigh Iron
District were built here. We have more experience in iron ore mining machinery than any other party in
Pennsylvania, having met excellent facilities for doing all kinds of engineering work. Our shops
are connected by a switch with competing lines in all directions. Parties needing anything in our line
will do well to consult us.



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CUYAHOGA WORKS
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STEAM
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BLAST FURNACE
Machinery.
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Beg to call the attention of manufacturers of Sheet, Hoop and Band Iron to their
Patent Roll Grinding Machines
for grinding the rolls used in said manufacture By grinding such rolls, instead of turning, a much
greater degree of accuracy is obtained, and as very much less metal is removed from the roll by the
grinding operation, the rolls will last much longer. Our Grinding Machines produce perfectly accurate
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NEW sizes Patent Malleable Iron Oilers,
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Of superior quality, and Hardware Specialties in
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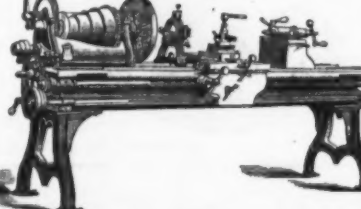



Peerless Automatic Damper Regulator.
Superior in every respect to all other Regulators.—Controls steam pressure within
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three months it will repay cost in economy of fuel, besides insuring steady power, economy of
repairs and safety from explosion. Prefer to have pressure mentioned when ordering. Price, \$25.00.
Thirty days' trial allowed before paying. **AMERICAN STEAM APPLIANCE CO., 13**
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THE "OLD RELIABLE"
UNIVERSAL
Clothes Wringer.
Improved with Rowell's Double Cog-Wheels on
both ends of each roll.
Over 500,000 sold!
And now in use, giving "Universal" satisfaction
EVERY WRINGER WARRANTED.
Be sure and inquire for the "Universal."
Sold by the Principal Jobbers in Har-
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Special rates given for export.




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With Quick Return Motion.
Engine Lathes, Planers, Boring Mills,
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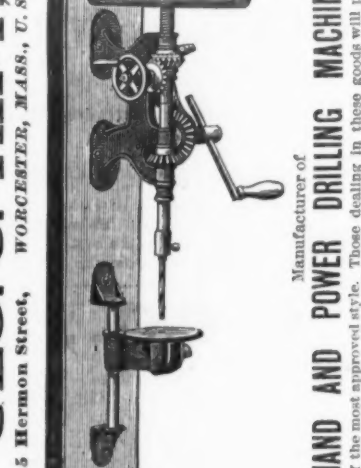
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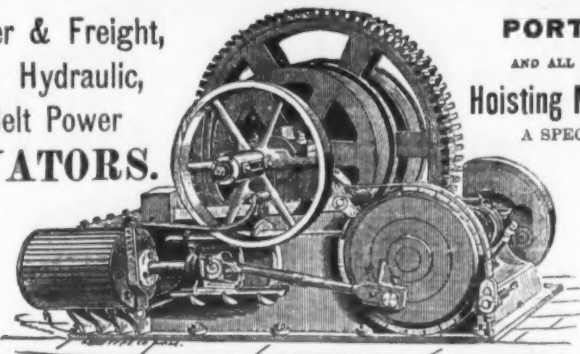


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Manufacturers of
HAND AND POWER DRILLING MACHINES
of the most approved style. Those dealing in these goods will please
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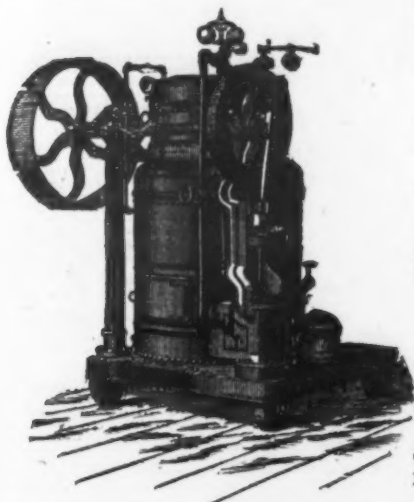
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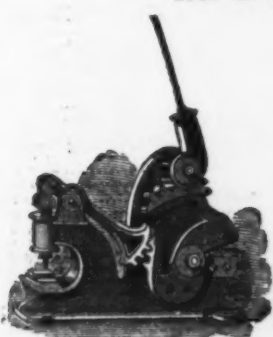
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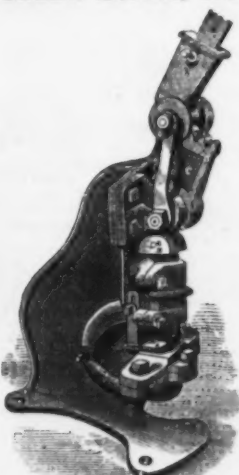


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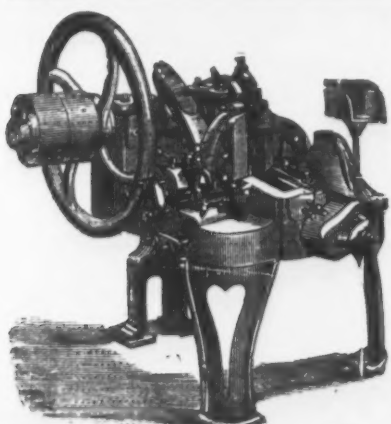
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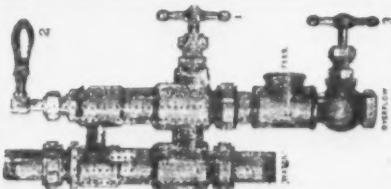
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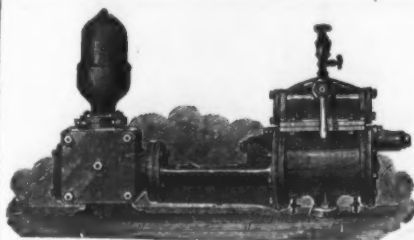


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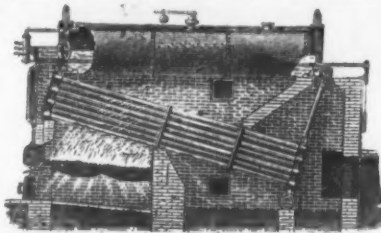
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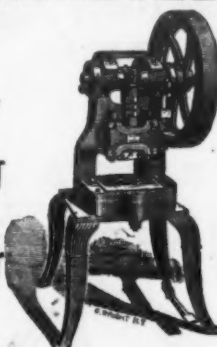
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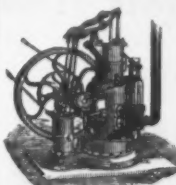


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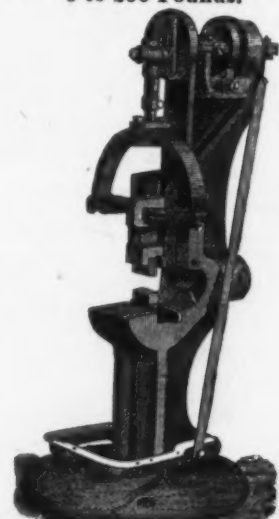
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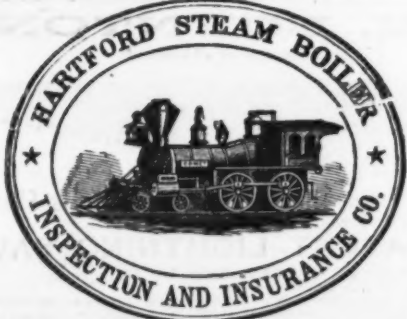
Size of Governor	Black	Fin-ished	Ball and Lever	Speed-er	Auto-matic Safety Check	Stop Valve
1/2 in.	\$16.00	\$18.00	\$1.00	\$2.25	\$.....	\$4.00
1 1/4 in.	18.00	20.00	2.00	2.35	.....	5.00
1 3/4 in.	20.00	23.00	2.25	2.50	.....	6.00
2 in.	23.00	27.00	2.50	2.75	.....	7.50
2 1/2 in.	27.00	31.00	3.00	3.00	.....	9.00
3 in.	30.00	35.00	3.50	3.25	.....	10.00
3 1/2 in.	35.00	40.00	4.00	3.50	.....	11.00
4 in.	40.00	45.00	4.50	3.75	.....	12.00
4 1/2 in.	45.00	50.00	5.00	4.00	.....	13.00
5 in.	50.00	55.00	5.50	4.25	.....	14.00
5 1/2 in.	55.00	60.00	6.00	4.50	.....	15.00
6 in.	60.00	65.00	6.50	4.75	.....	16.00
6 1/2 in.	65.00	70.00	7.00	5.00	.....	17.00
7 in.	70.00	75.00	7.50	5.25	.....	18.00
7 1/2 in.	75.00	80.00	8.00	5.50	.....	19.00
8 in.	80.00	85.00	8.50	5.75	20.00
8 1/2 in.	85.00	90.00	9.00	6.00	21.00
9 in.	90.00	95.00	9.50	6.25	22.00
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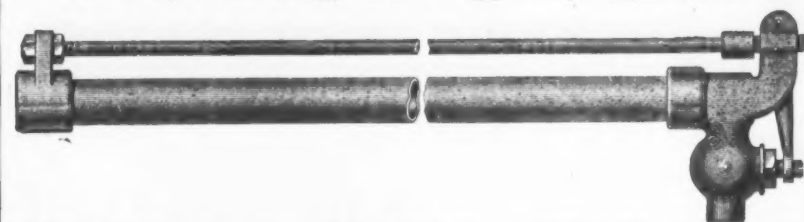
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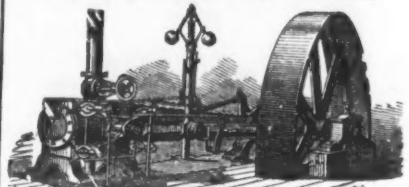
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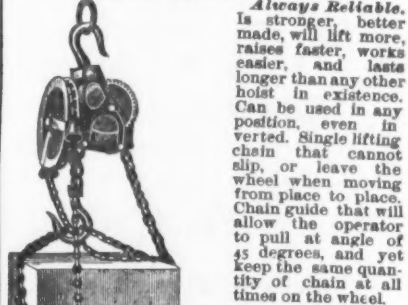
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